THE NATIONAL BEEKEEPING TRAINING AND EXTENSION MANUAL
The National Beekeeping Training and Extension Manual

(Simplified version)

Funded by:

- The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)
- Swisscontact Uganda
- Bees for Development under the Uganda Honey Trade Project (UHTP)
# Table of Contents

List of Figures ................................................................................................................................. 8  
Foreword ........................................................................................................................................... 10  
Acknowledgement ............................................................................................................................. 11  
List of Abbreviations ......................................................................................................................... 12  
Introduction ....................................................................................................................................... 13  
Key Process Definitions ..................................................................................................................... 14  
1.0 Occupational Profiles ................................................................................................................... 15  
2.0 Training Modules ........................................................................................................................... 23  
Overview of modules for bee equipment manufacturer .................................................................... 24  

### Job title: Bee Equipment Manufacturer ....................................................................................... 25  

<table>
<thead>
<tr>
<th>Module</th>
<th>Lesson</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODULE 1.1:</strong> Make basic bee protective wear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical Exercise 1.1.1: Make a basic bee suit</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Practical Exercise 1.1.2: Make foot wear</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Practical Exercise 1.1.3: Make basic gloves from polythene bags</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td><strong>MODULE 1.2:</strong> Make basic harvesting tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical Exercise 1.2.1: Make bird quill feather brush</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Practical Exercise 1.2.2: Make soft tree leaf brush</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td><strong>MODULE 1.3:</strong> Make a traditional bee smoker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical Exercise 1.3.1: Make a tin bee smoker</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>Practical Exercise 1.3.2: Make a grass bee smoker</td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>Practical Exercise 1.3.3: Make a clay pot bee smoker</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td><strong>MODULE 1.4:</strong> Produce Traditional Bee Hives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical Exercise 1.4.1: Make log bee hives</td>
<td></td>
<td>36</td>
</tr>
<tr>
<td>Practical Exercise 1.4.2: Make clay bee hives</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Practical Exercise 1.4.3: Make woven bee hives</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>Practical Exercise 1.4.4: Construct bamboo bee hive (fixed comb hive)</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td><strong>MODULE 1.5:</strong> Perform basic entrepreneurship tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical Exercise 1.5.1: Perform basic salesmanship tasks</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>Practical Exercise 1.5.2: Generate basic financial records</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>Practical Exercise 1.5.3: Provide basic customer care</td>
<td></td>
<td>42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupational Level 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODULE 2.1:</strong> Make transitional bee hives (top bar hives, Johnson bee hives, improved traditional bee hives)</td>
<td>44</td>
</tr>
<tr>
<td>Practical Exercise 2.1.1: Make a top bar bee hive</td>
<td>45</td>
</tr>
<tr>
<td>Practical Exercise 2.1.2: Make Johnson bee hive</td>
<td>46</td>
</tr>
<tr>
<td>Practical Exercise 2.1.3: Make an improved traditional bee hive</td>
<td>47</td>
</tr>
<tr>
<td><strong>MODULE 2.2:</strong> Produce bellow smokers (bee smokers)</td>
<td>48</td>
</tr>
<tr>
<td>Practical Exercise 2.2.1: Make a bee smoker nozzle</td>
<td>49</td>
</tr>
<tr>
<td>Practical Exercise 2.2.2: Make a bee smoker cylinder</td>
<td>49</td>
</tr>
<tr>
<td>Practical Exercise 2.2.3: Make a bee smoker pump</td>
<td>50</td>
</tr>
</tbody>
</table>


MODULE 2.3: Produce bee hive tools .......................................................... 51
Practical Exercise 2.3.1: Make a bee brush ............................................. 52
Practical Exercise 2.3.2: Make a bee hive tool ....................................... 52

MODULE 2.4: Produce bee suit and hand gloves ...................................... 54
Practical Exercise 2.4.1: Make hand wear (gloves) .................................. 55
Practical Exercise 2.4.2: Make a bee suit ............................................... 55

MODULE 2.5: Perform moderate entrepreneurship tasks .......................... 57
Practical Exercise 2.5.1: Perform moderate salesmanship tasks ............ 58
Practical Exercise 2.5.2: Perform marketing tasks .................................. 58
Practical Exercise 2.5.3: Provide customer care ...................................... 59

Occupational Level 3 ......................................................................... 60

MODULE 3.1: Make frame bee hive .......................................................... 61
Practical Exercise 3.1.1: Make frame bee hive ....................................... 62

MODULE 3.2: Make two-in-one bee suit (a jacket and trousers) .......... 64
Practical Exercises 3.2.1: Make two-in-one suit ................................. 65

MODULE 3.3: Make Bellow Smoker with grid ........................................ 66
Practical Exercise 3.1.1: Make bellow smoker with grid ..................... 67

MODULE 3.4: Perform advanced entrepreneurship tasks ....................... 68
Practical Exercise 3.4.1: Prepare a business plan ................................. 69
Practical Exercise 3.4.2: Prepare a profitability analysis ......................... 69

Overview of modules for the beekeeper ............................................... 70

Job title: Beekeeper ............................................................................. 71

Occupational Level 1 ........................................................................... 71

MODULE 1.1: Set up an apiary ................................................................. 72
Practical Exercise 1.1.1: Select apiary site .......................................... 73
Practical Exercise 1.1.2: Clear apiary site ............................................. 73
Practical Exercise 1.1.3: Prepare bee hives .......................................... 74
Practical Exercise 1.1.4: Install bee hives ............................................. 74
Practical Exercise 1.1.5: Fence off apiary ............................................. 75
Practical Exercise 1.1.6: Label the apiary ............................................. 75

MODULE 1.2: Control bee pests, predators and diseases ....................... 76
Practical Exercise 1.2.1: Identify bee pests, predators and diseases .... 77
Practical Exercise 1.2.2: Install rat guard ............................................. 77
Practical Exercise 1.2.3: Clean apiary .................................................. 78
Practical Exercise 1.2.4: Grease hive stands ....................................... 79
Practical Exercise 1.2.5: Apply used engine oil on hive stands .......... 79

MODULE 1.3: Harvest honey ................................................................ 81
Practical Exercise 1.3.1: Determine honey maturity ............................ 82
Practical Exercise 1.3.2: Light a bee smoker ....................................... 83
Practical Exercise 1.3.3: Harvest Honey ............................................. 84

MODULE 1.4: Perform basic entrepreneurship tasks ............................... 85
Practical Exercise 1.4.1: Perform basic salesmanship tasks ............... 86
Practical Exercise 1.4.2: Generate basic financial records ................. 86
Practical Exercise 1.4.3: Provide basic customer care ......................... 87

Occupational Level 2 ......................................................................... 88

MODULE 2.1: Populate bee hives ............................................................ 89
Practical Exercise 2.1.1: Bait bee hives ............................................... 90
Practical Exercise 2.1.2: Catch bee swarms ....................................... 91
Practical Exercise 2.1.3: Divide bee colonies ...................................... 92
Practical Exercise 2.1.4: Unite colonies .............................................. 93
**MODULE 2.2: Feed honey bees** ................................................................. 94
Practical Exercise 2.2.1: Establish bee forage ........................................ 95
Practical Exercise 2.2.2: Provide water .................................................. 96
Practical Exercise 2.2.3: Clean utensils for feeding bees ....................... 96
Practical Exercise 2.2.4: Identify natural bee forage plants ................... 97
Practical Exercise 2.2.5: Protect natural bee forage plants .................... 98

**MODULE 2.3: Harvest hive products** .................................................. 99
Practical Exercise 2.3.1: Determine honey maturity ............................... 100
Practical Exercise 2.3.2: Harvest honey ............................................... 101
Practical Exercise 2.3.3: Determine the moisture content of honey .......... 102
Practical Exercise 2.3.4: Harvest propolis ........................................... 103

**MODULE 2.4: Manage bee pests and predators** ............................... 104
Practical Exercise 2.4.1: Identify bee pests and predators ..................... 105
Practical Exercise 2.4.2: Control bee pests and predators ..................... 106

**MODULE 2.5: Perform moderate entrepreneurship tasks** ................. 107
Practical Exercise 2.5.1: Perform moderate salesmanship tasks ............ 108
Practical Exercise 2.5.2: Perform marketing tasks ............................... 108
Practical Exercise 2.5.3: Provide customer care .................................... 109

**Occupational Level 3** ..................................................................... 110

**MODULE 3.1: Manage honey bees in frame bee hives** ..................... 111
Practical Exercise 3.1.1: Bait frame bee hives ...................................... 112
Practical Exercise 3.1.2: Site frame bee hives ...................................... 112
Practical Exercise 3.1.3: Inspect frame bee hives .................................. 113
Practical Exercise 3.1.4: Harvest honey from frame bee hives ............ 114
Practical Exercise 3.1.5: Extract honey from frame bee hives ............... 115
Practical Exercise 3.1.6: Replace weak queens .................................... 116

**MODULE 3.2: Harvest and store bee hive products** ......................... 117
Practical Exercise 3.2.1: Harvest and store bee venom ....................... 118
Practical Exercise 3.2.2: Harvest and store bee pollen ....................... 119
Practical Exercise 3.2.3: Harvest and store royal jelly ....................... 120

**MODULE 3.3: Manage honey bee diseases** .................................... 121
Practical Exercise 3.3.1: Identify honey bee diseases ............................ 122
Practical Exercise 3.3.2: Control honey bee diseases ........................... 122

**MODULE 3.4: Prepare bee feeds** ..................................................... 124
Practical Exercise 3.4.1: Prepare sugar syrup ...................................... 125
Practical Exercise 3.4.2: Prepare honey feed ...................................... 126

**MODULE 3.5: Rear honey bee queens** ............................................ 127
Practical Exercise 3.5.1: Graft queens .................................................. 128
Practical Exercise 3.5.2: Rear queens using the cup kit method ............ 129
Practical Exercise 3.5.3: Rear queens using locally made queen cells .... 130

**MODULE 3.6: Perform advanced entrepreneurship tasks** ................ 131
Practical Exercise 3.6.1: Perform advanced salesmanship tasks .......... 132
Practical Exercise 3.6.2: Perform marketing tasks ............................... 133
Practical Exercise 3.6.3: Provide customer care ................................... 133

**Overview of modules for bee hive product processor** ....................... 134

**Job title: Bee Hive Product Processor** ............................................ 135

**Occupational Level 1** .................................................................... 135

**MODULE 1.1: Process honey** ............................................................ 136
Practical Exercise 1.1.1: Strain honey ............................................... 137
Practical Exercise 1.1.2: Press honey combs ..................................... 138
MODULE 1.2: Process beeswax................................................................. 139
Practical Exercise 1.2.1: Process beeswax ........................................ 140

MODULE 1.3: Perform basic entrepreneurship tasks.............................. 141
Practical Exercise 1.3.1: Perform basic salesmanship tasks .................. 142
Practical Exercise 1.3.2: Generate basic financial records ................... 142
Practical Exercise 1.3.3: Provide basic customer care ......................... 143

Occupational Level 2.................................................................... 144

MODULE 2.1: Process and pack honey.................................................... 145
Practical Exercise 2.1.1: Extract honey ............................................... 146
Practical Exercise 2.1.2: Process liquid honey ................................. 146
Practical Exercise 2.1.3: Process cream honey ................................. 147
Practical Exercise 2.1.4: Process granulated honey ......................... 148

MODULE 2.2: Mould beeswax................................................................. 150
Practical Exercise 2.2.1: Produce beeswax candles ............................ 151

MODULE 2.3: Clean propolis................................................................. 152
Practical Exercise 2.3.1: Remove impurities from propolis .................. 153

MODULE 2.4: Perform moderate entrepreneurship tasks...................... 154
Practical Exercise 2.4.1: Perform moderate salesmanship tasks ........... 155
Practical Exercise 2.4.2: Perform marketing tasks ......................... 155
Practical Exercise 2.4.3: Provide customer care ............................... 156

Occupational Level 3.................................................................... 157

MODULE 3.1: Produce honey-based products....................................... 158
Practical Exercise 3.1.1: Make honey wine ...................................... 159
Practical Exercise 3.1.2: Make honey cream .................................... 159
Practical Exercise 3.1.3: Make honey vinegar ................................. 160

MODULE 3.2: Make beeswax products.................................................. 161
Practical Exercise 3.2.1: Make beeswax candles ............................... 162
Practical Exercise 3.2.2: Make beeswax ointment ............................ 163
Practical Exercise 3.2.3: Make beeswax floor/furniture polish ......... 163

MODULE 3.3: Make propolis products.................................................. 165
Practical Exercise 3.3.1: Make propolis tincture ............................... 166
Practical Exercise 3.3.2: Make propolis ointment ............................ 167

MODULE 3.4: Perform advanced entrepreneurship Tasks .................... 168
Practical Exercise 3.4.1: Prepare a business plan ............................. 169
Practical Exercise 3.4.2: Conduct a profitability analysis ................. 169

3.0 Information on Development Process:....................................... 170

Appendices ................................................................................. 171
List of participants (Development process) ...................................... 171
List of participants (Quality Assurance process) ......................... 172
Common Beekeeping Terms .......................................................... 174
# List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Making a protective wear from locally available materials</td>
<td>26</td>
</tr>
<tr>
<td>2</td>
<td>Making a feather brush</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>Bird leather</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>Traditional smokers</td>
<td>35</td>
</tr>
<tr>
<td>5</td>
<td>Making a log hive</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>The log hive</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>Clay pot hives</td>
<td>37</td>
</tr>
<tr>
<td>8</td>
<td>Woven basket hive</td>
<td>38</td>
</tr>
<tr>
<td>9</td>
<td>Improved bamboo bee hive</td>
<td>39</td>
</tr>
<tr>
<td>10</td>
<td>Keeping financial records</td>
<td>40</td>
</tr>
<tr>
<td>11</td>
<td>KTB hives</td>
<td>44</td>
</tr>
<tr>
<td>12</td>
<td>Dimensions of a KTB hive</td>
<td>45</td>
</tr>
<tr>
<td>13</td>
<td>Types of top bars: T-shaped, V-shaped, Grooved-top bar and half round top bar</td>
<td>45</td>
</tr>
<tr>
<td>14</td>
<td>Johnson hive</td>
<td>46</td>
</tr>
<tr>
<td>15</td>
<td>Making a bellow bee smoker</td>
<td>48</td>
</tr>
<tr>
<td>16</td>
<td>Illustration of parts of a bee smoker</td>
<td>49</td>
</tr>
<tr>
<td>17</td>
<td>Making a bee brush</td>
<td>51</td>
</tr>
<tr>
<td>18</td>
<td>Hive tool</td>
<td>52</td>
</tr>
<tr>
<td>19</td>
<td>Making gloves</td>
<td>54</td>
</tr>
<tr>
<td>20</td>
<td>Bee veil plan</td>
<td>55</td>
</tr>
<tr>
<td>21</td>
<td>Displaying beekeeping equipment for sale</td>
<td>57</td>
</tr>
<tr>
<td>22</td>
<td>Making frame hives</td>
<td>61</td>
</tr>
<tr>
<td>23</td>
<td>Dimensions of frame</td>
<td>62</td>
</tr>
<tr>
<td>24</td>
<td>Queen excluder</td>
<td>62</td>
</tr>
<tr>
<td>25</td>
<td>Making a bee suit</td>
<td>64</td>
</tr>
<tr>
<td>26</td>
<td>Making a bee smoker with grids</td>
<td>66</td>
</tr>
<tr>
<td>27</td>
<td>A bee smoker with grids</td>
<td>67</td>
</tr>
<tr>
<td>28</td>
<td>Analyzing sales and profits from the business</td>
<td>68</td>
</tr>
<tr>
<td>29</td>
<td>Making observations and assessing a site for an apiary</td>
<td>72</td>
</tr>
<tr>
<td>30</td>
<td>Wax moth</td>
<td>76</td>
</tr>
<tr>
<td>31</td>
<td>Installing rat guards</td>
<td>77</td>
</tr>
<tr>
<td>32</td>
<td>Greasing hive stands</td>
<td>79</td>
</tr>
<tr>
<td>33</td>
<td>Harvesting from a traditional hive</td>
<td>81</td>
</tr>
<tr>
<td>34</td>
<td>Illustration of the floral calendar</td>
<td>82</td>
</tr>
<tr>
<td>35</td>
<td>Keeping records</td>
<td>85</td>
</tr>
<tr>
<td>36</td>
<td>Transferring bees</td>
<td>89</td>
</tr>
<tr>
<td>37</td>
<td>The honey bee castes</td>
<td>90</td>
</tr>
<tr>
<td>38</td>
<td>Illustration of honey bee life cycle</td>
<td>90</td>
</tr>
<tr>
<td>39</td>
<td>Catching a bee swarm</td>
<td>91</td>
</tr>
<tr>
<td>40</td>
<td>Planting bee forage</td>
<td>94</td>
</tr>
<tr>
<td>41</td>
<td>Calliandra bee forage plant</td>
<td>95</td>
</tr>
<tr>
<td>42</td>
<td>Watering bees</td>
<td>96</td>
</tr>
<tr>
<td>43</td>
<td>Harvesting from a KTB hive</td>
<td>99</td>
</tr>
<tr>
<td>44</td>
<td>Air-tight buckets</td>
<td>101</td>
</tr>
<tr>
<td>45</td>
<td>A honey refractometer</td>
<td>102</td>
</tr>
<tr>
<td>46</td>
<td>Harvesting propolis from a top bar hive</td>
<td>103</td>
</tr>
<tr>
<td>47</td>
<td>Bee predators</td>
<td>104</td>
</tr>
<tr>
<td>48</td>
<td>Photographing and identifying bee predators</td>
<td>105</td>
</tr>
<tr>
<td>49</td>
<td>Explaining the parts of a KTB hive to customers</td>
<td>107</td>
</tr>
<tr>
<td>50</td>
<td>A Langstroth hive</td>
<td>111</td>
</tr>
<tr>
<td>51</td>
<td>Honey Centrifuge</td>
<td>115</td>
</tr>
<tr>
<td>52</td>
<td>Harvesting pollen</td>
<td>117</td>
</tr>
<tr>
<td>53</td>
<td>Bee pollen</td>
<td>119</td>
</tr>
<tr>
<td>54</td>
<td>A fenced apiary for preventing pests, predators and diseases</td>
<td>121</td>
</tr>
<tr>
<td>55</td>
<td>Preparing sugar syrup</td>
<td>124</td>
</tr>
<tr>
<td>56</td>
<td>Natural and artificial queen cells</td>
<td>127</td>
</tr>
<tr>
<td>57</td>
<td>Presentation of business performance over the years</td>
<td>131</td>
</tr>
<tr>
<td>58</td>
<td>Pressing honey combs</td>
<td>136</td>
</tr>
<tr>
<td>59</td>
<td>Beeswax blocks</td>
<td>139</td>
</tr>
<tr>
<td>60</td>
<td>Advertising bee hive products</td>
<td>141</td>
</tr>
</tbody>
</table>
Figure 61: Packed honey .................................................................................................................. 145
Figure 62: Beeswax candles ............................................................................................................ 150
Figure 63: Breaking and removing impurities from crude propolis ............................................ 152
Figure 64: Sale of bee hive products ............................................................................................. 154
Figure 65: Honey wine .................................................................................................................. 158
Figure 66: Honey cream ............................................................................................................... 158
Figure 67: Beeswax ointment ........................................................................................................ 158
Figure 67: Making beeswax candles .............................................................................................. 161
Figure 68: Beeswax furniture polish .............................................................................................. 163
Figure 69: Crude propolis ............................................................................................................. 165
Figure 70: Making propolis products ............................................................................................ 166
Figure 71: Packed propolis tincture ............................................................................................... 166
Figure 72: Packed propolis ointment ............................................................................................. 167
Figure 73: A meeting to discuss a business plan .......................................................................... 168
Foreword

This manual is a Competence-Based Education and Training (CBET) tool and consists of two major parts.

**PART I: The “Occupational Profiles” (OP) of a Bee Equipment Manufacturer, Beekeeper, and Bee Hive Product Processor.**

These Occupational Profiles were developed by practitioners in the three fields practicing in work life. They show the duties and tasks that Bee Equipment Manufacturers, Beekeepers and Bee Hive Product Processors are expected to perform in the world of work.

**PART II: “Training Modules”**

These modules have been prepared in the form of guidelines to train Bee Equipment Manufacturers, Beekeepers, and Bee Hive Product Processors both on the job as well as in training centres (or combinations of both venues of learning). The Training Modules herein have been developed basing on the Occupational Profiles thereof and hence are directly relevant for employment.

The modular format of the curriculum (PART II) allows learners/participants to acquire job specific skills and knowledge (i.e. competencies) module by module. A single module can be accomplished within a relatively short duration of time (between 2 and eight weeks), allowing learners to move directly into an entry level job, go for further modules or advance to higher levels of training. Modular courses allow more learners to access the training system because training centres as well as farms/apiaries can accommodate more learners in a given period of time.

The parts of this manual were sequentially developed as follows:

Part 1: Occupational Profiles (Occupational levels 1, 2 and 3): February 2013
Part 2: Training Modules (Occupational levels 1, 2 and 3): March 2013

This manual (or parts of it) may be periodically revised to match the dynamic trends in the occupations/jobs and hence issued in different versions.

**Dr. Nicholas Kauta**  
**Director, Animal Resources**  
**The Ministry of Agriculture, animal Industry and fisheries (MAAIF)**
Acknowledgement

This simplified manual version was developed by three different partners who agreed to simplify the existing manual that was developed by MAAIF. These include Swisscontact Uganda, The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and The Uganda National Apiculture Development Organization (TUNADO).

A lot of gratitude is extended to the participants who were involved in simplifying the manual. These include Mr. Jackson M. Jurua, Mr. John Kaddu, Mr. Chemurot Moses, Mr. Ainebyona Clives, Mr. Bugaari Ambrose, Mrs. Alice Kangave, Mr. Biryumumaisho Dickson, Mr. Kisaali Bosco, Mr. Butele Cosmas Alfred, Mrs. Christine Ogwang, Mrs. Ogaba R. A. Margaret, Mr. Bagonza Adolph. Their efforts and time invested in simplifying this manual is highly appreciated, and will go a long way in improving the apiculture sector.

The coordinating teams from the three agencies equally made the process possible. They include Mrs. Kangave Alice from MAAIF; Mr. Biryomumaisho Dickson, Mr. Jackson M. Jurua, from TUNADO; Mr. Kyeyune David, Ms. Asiimwe Carol from Swisscontact.

Finally great appreciation goes to the consultants from Skills Initiative Uganda (SIU), who guided the whole process- Mr. Kunya Joshua and Mrs. Tumusiime Deborah Asikeit.

Bright Rwamirama (MP)
Hon. Minister of State Animal Industry
## List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADB</td>
<td>African Development Bank</td>
</tr>
<tr>
<td>CBET</td>
<td>Competency Based Education and Training</td>
</tr>
<tr>
<td>DACUM</td>
<td>Develop a Curriculum</td>
</tr>
<tr>
<td>FIEFOC</td>
<td>Farm Income Enhancement and Forest Conservation Project</td>
</tr>
<tr>
<td>KBA Ltd</td>
<td>Kabarole Beekeepers Association Limited</td>
</tr>
<tr>
<td>KTB</td>
<td>Kenya Top bar</td>
</tr>
<tr>
<td>MAAIF</td>
<td>Ministry of Agriculture, Animal Industry and Fisheries</td>
</tr>
<tr>
<td>MEBKC</td>
<td>Mount Elgon Beekeeping Community</td>
</tr>
<tr>
<td>NARO</td>
<td>National Agricultural Research Organisation</td>
</tr>
<tr>
<td>NaLIRRI</td>
<td>National Livestock Resources Research Institute</td>
</tr>
<tr>
<td>OP</td>
<td>Occupational Profile</td>
</tr>
<tr>
<td>PEX</td>
<td>Practical Exercise</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>SIU</td>
<td>Skills Initiative Uganda Limited</td>
</tr>
<tr>
<td>TUNADO</td>
<td>The Uganda National Apiculture Development Organization</td>
</tr>
<tr>
<td>TVET</td>
<td>Technical, Vocational Education and Training</td>
</tr>
<tr>
<td>UHTP</td>
<td>Uganda Honey Trade Project</td>
</tr>
</tbody>
</table>
Introduction

In August 2012, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) launched the National Beekeeping Training and Extension Manual under the Farm Income Enhancement and Forest Conservation Project (FIEFOC). FIEFOC project was funded by the Government of Uganda and African Development Bank (ADB). It was implemented by the Ministry of Agriculture, Animal Industry and Fisheries and the Ministry of Water and Environment. The National Beekeeping Training and Extension Manual was timely and provided an opportunity for harmonizing training programmes in the country. Before the National Beekeeping Training and Extension Manual was developed, information required for training along the value chain was very scanty. This was a very big challenge in providing training and extension works, thus affecting apiculture production.

However, after the launch of the manual, value chain actors remained concerned that the manual needed to be simplified for easy usage. TUNADO being the apex body was tasked to coordinate the simplification process. Therefore, TUNADO and MAAIF partnered with Swisscontact Uganda to simplify the manual so that it can be used by even ordinary farmers. Skills Initiative Uganda (SIU), TVET consultancy firm was hired to simplify the manual.

The process started with mapping and defining the competencies of each of the three trades/jobs. This culminated in the three occupational profiles for Bee Equipment Manufacturer, Beekeeper and Bee Hive Product Processor. These form part 1 of this document.

The modules in original manual were mapped and refined along the lines of the three different trades/jobs using the defined competencies. The result is a simplified manual for each of the three trades/jobs.

Average duration of modules is contact time but NOT calendar duration. It is assumed that:

- One week is equivalent to five days of nominal learning, one month is equivalent to twenty days of nominal learning;
- Information given on the average duration of training should be understood as a guideline. Quick learners may need less time than indicated or vice versa.

At completion of a module, the learner/participant should be able to satisfactorily perform the included Practical Exercises (PEXs) and attached theoretical instruction, as the minimum requirement.
# Key Process Definitions

<table>
<thead>
<tr>
<th>Competence / CBET</th>
<th>(Occupational) competence is understood as the ability to perform tasks common to an occupation/Job at an acceptable level. Competence-based education and training means that programmes: ● have content directly related to work ● focus is on “doing something well” ● assessment is based upon industry work standards, and ● curricula are developed in modular form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty</td>
<td>A Duty describes a large area of work in performance terms. A duty serves as a title for a cluster of related tasks</td>
</tr>
<tr>
<td>Module</td>
<td>Modules are part(s) of a whole curriculum. Modules can be considered as “self-contained” partial qualifications which are described by learning outcomes or competencies and which can be assessed and certified individually</td>
</tr>
<tr>
<td>Occupational /Job Profile (OP)</td>
<td>An Occupational/Job Profile is an overview of the duties and tasks a job incumbent is expected to perform competently in employment. Occupational/Job Profiles developed by practitioners from the world of work enhance the relevance of training and learning to the requirements of the world of work. Occupational/Job Profiles define WHAT a person is supposed to do which become the reference points for developing assessment standards and modular curricula</td>
</tr>
<tr>
<td>Task</td>
<td>Job TASKS represent the smallest unit of job activities with a meaningful outcome. Tasks result in a product, service, or decision. They represent an assignable unit of work and have a definite beginning and ending point. Tasks can be observed and measured</td>
</tr>
</tbody>
</table>
1.0 Occupational Profiles

Occupational Profiles for Bee Equipment Manufacturer, Beekeeper and the Bee Hive Products Processor

The OCCUPATIONAL/JOB PROFILE (OP) for Bee Equipment Manufacturer, Beekeeper and Bee Hive Products Processor below defines the Duties and Tasks a competent Bee Equipment Manufacturer, Beekeeper and Bee Hive Products Processor perform in the world of work (on the job) in Uganda today.

Since it reflects the skill requirements of work life, the Occupational/Job Profile is the reference document for the subsequent development of training modules, which are directly relevant to employment in Ugandan businesses and farms/apiaries.

To ensure that Occupational/Job Profile is relevant for employment in Uganda, the consultants used the method of “DACUM.”

This method involves the brainstorming of a panel of 8 to 12 competent job practitioners guided by a trained and experienced facilitator. During a two-day workshop the panellists define the duties and tasks performed in employment, as well as the prerequisite skills, knowledge, attitudes, tools and equipment, and the future trends and concerns in the occupation/job. The panellists, facilitators and co-ordinators who participated in developing this OP for Bee Equipment Manufacturer, Beekeeper and Bee Hive Products Processor are listed in the following pages.

1 *The DACUM-method was used. DACUM is an acronym for Develop a Curriculum.*
Expert Panel
Atururinde Elly
Golden bee
Kisaali Bosco
MEBK C
Orupia Stephen
Agaria
Ayatuhairre Asaph
West Honeys’ U’
Patrice Kasangaki
NARO (NaLIRRI)
Moses Chemurot
Makerere University
Adrole Eschol
Terego Beekeepers Association
Cosmas Alfred Butele
MAAIF
Mugisha Elly
Bushenyi Connoisseur Honeys Coop Society
Christine Ogwang
Gate’s Honey
Margaret R. A Ogaba
JLLIMA Holdings Ltd
Evelyn Sekkidde
Bee House Products
Chandia Adam
Sulma Foods
Bagonza Adolph
KBA Ltd

Coordination team
Alice Kangave
MAAIF
Caroline Asiimwe
SwissContact
Dickson Biryomumaisho
TUNADO

Facilitator team
Joshua Kunya
TVET Specialist
Skills Initiative Uganda
Deborah A. Tumusiime
TVET Specialist
Skills Initiative Uganda

Job Profile
(Partial) of a

“Bee Equipment Manufacturer”

Dates of Workshop:
26 - 27 February 2013
Kampala
<table>
<thead>
<tr>
<th>DUTIES</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A SET WORKSHOP</strong></td>
<td>A1 Identify site</td>
</tr>
<tr>
<td></td>
<td>A2 Construct shade/workshop</td>
</tr>
<tr>
<td></td>
<td>A3 Install workplace equipment</td>
</tr>
<tr>
<td></td>
<td>A4 Clean machines</td>
</tr>
<tr>
<td></td>
<td>A5 Grease/oil machines</td>
</tr>
<tr>
<td></td>
<td>A6 Replace worn-out parts</td>
</tr>
<tr>
<td></td>
<td>A7 Clean workplace</td>
</tr>
<tr>
<td></td>
<td>A8 Demarcate workplace (e.g. placing sign posts, machines)</td>
</tr>
<tr>
<td></td>
<td>A9 Clean bee equipment</td>
</tr>
<tr>
<td></td>
<td>A10 Store tools, equipment, material</td>
</tr>
<tr>
<td><strong>B CONSTRUCT WOODEN BEE HIVES</strong></td>
<td>B1 Sort timber</td>
</tr>
<tr>
<td></td>
<td>B2 Season timber</td>
</tr>
<tr>
<td></td>
<td>B3 Plane timber</td>
</tr>
<tr>
<td></td>
<td>B4 Split timber</td>
</tr>
<tr>
<td></td>
<td>B5 Cut timber</td>
</tr>
<tr>
<td></td>
<td>B6 Groove timber</td>
</tr>
<tr>
<td></td>
<td>B7 Ribbet timber</td>
</tr>
<tr>
<td></td>
<td>B8 Smoothen timber</td>
</tr>
<tr>
<td></td>
<td>B9 Preserve timber</td>
</tr>
<tr>
<td></td>
<td>B10 Produce roof cover</td>
</tr>
<tr>
<td></td>
<td>B11 Prepare queen excluder</td>
</tr>
<tr>
<td></td>
<td>B12 Drill holes</td>
</tr>
<tr>
<td></td>
<td>B13 Fix hanging wires</td>
</tr>
<tr>
<td></td>
<td>B14 Bait hive</td>
</tr>
<tr>
<td></td>
<td>B15 Fix top bars</td>
</tr>
<tr>
<td></td>
<td>B16 Brand equipment (e.g. hives, protective gear)</td>
</tr>
<tr>
<td></td>
<td>B17 Prepare foundation sheets</td>
</tr>
<tr>
<td></td>
<td>B18 Join timber</td>
</tr>
<tr>
<td></td>
<td>B19 Shoot timber</td>
</tr>
<tr>
<td></td>
<td>B20 Mortice/drill flight entrance holes</td>
</tr>
<tr>
<td></td>
<td>B21 Fix frame spacers</td>
</tr>
<tr>
<td><strong>C CONSTRUCT TRADITIONAL BEE HIVES</strong></td>
<td>C1 Prepare clay soil</td>
</tr>
<tr>
<td></td>
<td>C2 Mould pot hives</td>
</tr>
<tr>
<td></td>
<td>C3 Burn pot hive</td>
</tr>
<tr>
<td></td>
<td>C4 Cut material (e.g. bamboo pieces, pegs, logs, flexible twigs)</td>
</tr>
<tr>
<td></td>
<td>C5 Split/slice material (e.g. bamboo, papyrus, reeds)</td>
</tr>
<tr>
<td></td>
<td>C6 Join bamboo pieces</td>
</tr>
<tr>
<td></td>
<td>C7 Chop log</td>
</tr>
<tr>
<td></td>
<td>C8 Excavate inside the log</td>
</tr>
<tr>
<td></td>
<td>C9 Prepare log covers</td>
</tr>
<tr>
<td></td>
<td>C10 Cut openings</td>
</tr>
<tr>
<td></td>
<td>C11 Join plastic containers</td>
</tr>
<tr>
<td></td>
<td>C12 Smear hives (e.g. woven, bamboo)</td>
</tr>
<tr>
<td></td>
<td>C13 Wrap hive</td>
</tr>
<tr>
<td><strong>D PRODUCE BEE PROTECTIVE GEAR</strong></td>
<td>D1 Measure materials (e.g. cloth, canvas, rubber)</td>
</tr>
<tr>
<td></td>
<td>D2 Cut material (e.g. cloth, canvas, rubber)</td>
</tr>
<tr>
<td></td>
<td>D3 Join material</td>
</tr>
<tr>
<td></td>
<td>D4 Produce protective footwear</td>
</tr>
<tr>
<td></td>
<td>D5 Produce gloves</td>
</tr>
<tr>
<td></td>
<td>D6 Produce bee veil</td>
</tr>
<tr>
<td></td>
<td>D7 Finish protective gear (e.g. overall, veil)</td>
</tr>
<tr>
<td></td>
<td>D8 Test protective gear</td>
</tr>
<tr>
<td><strong>E PRODUCE SITING MATERIAL</strong></td>
<td>E1 Cut metal/poles</td>
</tr>
<tr>
<td></td>
<td>E2 Bend material (e.g. metal)</td>
</tr>
<tr>
<td></td>
<td>E3 Weld/join metal</td>
</tr>
<tr>
<td></td>
<td>E4 Join wooden stands</td>
</tr>
<tr>
<td></td>
<td>E5 Fix pest guards</td>
</tr>
<tr>
<td></td>
<td>E6 Paint/spray material (e.g. stand, tools)</td>
</tr>
<tr>
<td></td>
<td>E7 Dig holes</td>
</tr>
<tr>
<td></td>
<td>E8 Fix holding wires</td>
</tr>
<tr>
<td><strong>F PRODUCE BEE SMOKER</strong></td>
<td>F1 Cut sheets</td>
</tr>
<tr>
<td></td>
<td>F2 Curve sheets</td>
</tr>
<tr>
<td></td>
<td>F3 Fabricate ash tray</td>
</tr>
<tr>
<td></td>
<td>F4 Cut wood</td>
</tr>
<tr>
<td></td>
<td>F5 Cut leather</td>
</tr>
<tr>
<td></td>
<td>F6 Fix spring</td>
</tr>
<tr>
<td></td>
<td>F7 Join bee smoker</td>
</tr>
<tr>
<td></td>
<td>F8 Fix leather binding</td>
</tr>
<tr>
<td></td>
<td>F9 Fix ash tray</td>
</tr>
<tr>
<td></td>
<td>F10 Finish bee smoker (i.e. sanding, smoothering sharp edges)</td>
</tr>
<tr>
<td></td>
<td>F11 Test bee smoker</td>
</tr>
</tbody>
</table>
**G PRODUCTIVE HIVE TOOLS**

<table>
<thead>
<tr>
<th>G1 Shape material</th>
<th>G2 Sharpen material</th>
<th>G3 Smoothen tool</th>
<th>G4 Produce wooden handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>G5 Fix brush bristles</td>
<td>G6 Finish hive tools (e.g. hive tool, bee brush, cutting knife)</td>
<td>G7 Dispose of waste</td>
<td></td>
</tr>
</tbody>
</table>

**H MANUFACTURE QUEEN REARING KIT**

<table>
<thead>
<tr>
<th>H1 Fabricate nucleus box</th>
<th>H2 Fabricate queen rearing frame</th>
<th>H3 Make queen cells</th>
<th>H4 Produce queen cages</th>
</tr>
</thead>
<tbody>
<tr>
<td>H5 Produce feeder box</td>
<td>H6 Produce grafting tools (e.g. needles)</td>
<td>H7 Test queen rearing kit</td>
<td></td>
</tr>
</tbody>
</table>

**I MANUFACTURE HONEY PROCESSING EQUIPMENT**

<table>
<thead>
<tr>
<th>I1 Produce honey press</th>
<th>I2 Modify food grade materials (e.g. by perforating)</th>
<th>I3 Participate in fabrication of centrifuge machine</th>
<th>I4 Fabricate stainless steel settling tanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I5 Produce honey heaters</td>
<td>I6 Produce honey tester</td>
<td>I7 Fabricate solar wax tester</td>
<td>I8 Produce wooden squeezer</td>
</tr>
<tr>
<td>I9 Test honey equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**J PERFORM ADMINISTRATIVE TASKS**

<table>
<thead>
<tr>
<th>J1 Purchase material</th>
<th>J2 Supervise workers</th>
<th>J3 Market bee equipment</th>
<th>J4 Perform financial obligations (e.g. paying taxes, bills)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J5 Generate financial records (e.g. cash sales, debtors list)</td>
<td>J6 Generate production records (e.g. work schedules, attendance lists)</td>
<td>J7 Train stakeholders (e.g. workers, clients)</td>
<td>J8 Assign tasks to workers</td>
</tr>
</tbody>
</table>
Job Profile (Partial) of a “Beekeeper”

Dates of Workshop: 26 - 27 February 2013
Kampala
<table>
<thead>
<tr>
<th>Duties</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> SET-UP AN APIARY</td>
<td>A1 Select apiary site</td>
</tr>
<tr>
<td></td>
<td>A5 Label apiary</td>
</tr>
<tr>
<td><strong>B</strong> POPULATE BEE HIVES</td>
<td>B1 Bait bee hives</td>
</tr>
<tr>
<td></td>
<td>B5 Determine transfer time</td>
</tr>
<tr>
<td><strong>C</strong> INSPECT BEE HIVES</td>
<td>C1 Wear protective gear</td>
</tr>
<tr>
<td></td>
<td>C5 Remove unwanted material</td>
</tr>
<tr>
<td><strong>D</strong> HARVEST BEE HIVE PRODUCTS</td>
<td>D1 Prepare harvesting equipment</td>
</tr>
<tr>
<td></td>
<td>D5 Collect pollen</td>
</tr>
<tr>
<td></td>
<td>D9 Determine hive product quality (e.g. contamination, maturity)</td>
</tr>
<tr>
<td><strong>E</strong> CONTROL BEE PESTS, PREDATORS AND DISEASES</td>
<td>E1 Identify bee pests, predators and diseases</td>
</tr>
<tr>
<td></td>
<td>E5 Prepare bio-pesticides</td>
</tr>
<tr>
<td><strong>F</strong> FEED BEES</td>
<td>F1 Establish bee forage (e.g. plant flowers)</td>
</tr>
<tr>
<td></td>
<td>F5 Clean feeding utensils</td>
</tr>
<tr>
<td><strong>G</strong> PERFORM ADMINISTRATIVE TASKS</td>
<td>G1 Purchase material (e.g. colonies, feeds)</td>
</tr>
<tr>
<td></td>
<td>G5 Generate financial records (e.g. cash sales, debtors list)</td>
</tr>
<tr>
<td></td>
<td>G8 Assign tasks to workers</td>
</tr>
</tbody>
</table>
Job Profile (Partial) of a

“Bee Hive Product Processor”

Dates of Workshop: 26 - 27 February 2013
Kampala
<table>
<thead>
<tr>
<th>Duties</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A PROCESS HONEY</strong></td>
<td>A1 Test moisture content</td>
</tr>
<tr>
<td></td>
<td>A5 Settle honey</td>
</tr>
<tr>
<td></td>
<td>A9 Produce honey sweets and candles</td>
</tr>
<tr>
<td></td>
<td>A13 Pack honey/other products</td>
</tr>
<tr>
<td><strong>B PROCESS PROPOLIS</strong></td>
<td>B1 Clean propolis</td>
</tr>
<tr>
<td></td>
<td>B5 Agitate mixture</td>
</tr>
<tr>
<td></td>
<td>B9 Store propolis tincture</td>
</tr>
<tr>
<td><strong>C PROCESS BEE WAX</strong></td>
<td>C1 Sort bee combs</td>
</tr>
<tr>
<td></td>
<td>C5 Filter molten wax</td>
</tr>
<tr>
<td></td>
<td>C9 Break up beeswax</td>
</tr>
<tr>
<td></td>
<td>C13 Store beeswax</td>
</tr>
<tr>
<td><strong>D PRODUCE APITHERAPY PRODUCTS</strong></td>
<td>D1 Extract bee pollen</td>
</tr>
<tr>
<td></td>
<td>D5 Pack royal jelly</td>
</tr>
<tr>
<td></td>
<td>D9 Store bee venom</td>
</tr>
<tr>
<td></td>
<td>D13 Pack propolis ointment</td>
</tr>
<tr>
<td><strong>E PERFORM ADMINISTRATIVE TASKS</strong></td>
<td>E1 Purchase material</td>
</tr>
<tr>
<td></td>
<td>E5 Generate financial records (e.g. cash sales, debtors list)</td>
</tr>
</tbody>
</table>
2.0 Training Modules

Training Modules for Bee Equipment Manufacturer, Beekeeper and Bee Hive Product Processor

2.1 A curriculum is a “guide/plan for teaching and learning” which guides teachers, instructors and learners. In the envisaged system of Competence-Based or outcome-oriented Education and Training (CBET), Occupational Profiles provide the basis for Curriculum Development.

2.2 This modular format of the curriculum allows learners of Bee equipment manufacturer, beekeeper/bee farmer and bee hive product processor occupations to acquire job specific skills and knowledge (i.e. competencies) module by module. A single module can be accomplished within a relatively short duration of time allowing learners to move directly into an entry level job, do further modules and or advance to higher levels of training. Modular training allows more learners to access the training system because training centres as well as farms/apiaries can accommodate more students in a given period of time.

2.3 These modules were developed jointly by beekeeping trainers, officials from the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), The Uganda Apiculture Development Organisation (TUNADO) and job practitioners. They were developed using the Occupational Profiles as reference points.

2.4 The modules contain “Practical Exercises” (PEXs) as key elements. PEXs are actions in real job situations/assignments that are suitable for learning in a training environment.

2.5 In principle, and following the philosophy of Competence-Based Education and Training (CBET), the modules can be used as a guide for learning in a training centre or at the work place (e.g. apiary) or combinations of both.
## Overview of modules for bee equipment manufacturer

<table>
<thead>
<tr>
<th>Code</th>
<th>Average duration</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Days</td>
<td>Weeks</td>
</tr>
<tr>
<td><strong>Bee Equipment Manufacturer Level 1 modules</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UA/EM/1.1</td>
<td>Make basic protective wear</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>UA/EM/1.2</td>
<td>Make basic harvesting tools</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>UA/EM/1.3</td>
<td>Make traditional smoker</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>UA/EM/1.4</td>
<td>Make traditional hives</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>UA/EM/1.5</td>
<td>Perform basic entrepreneurship</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td><strong>Bee Equipment Manufacturer Level 2 modules</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UA/EM/2.1</td>
<td>Make transitional hives (top bar hives, Johnson hives, improved traditional hives)</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>UA/EM/2.2</td>
<td>Produce bellow smokers (bee smokers)</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>UA/EM/2.3</td>
<td>Produce bee hive tools</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>UA/EM/2.4</td>
<td>Produce bee suit and hand gloves</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>UA/EM/2.5</td>
<td>Perform moderate entrepreneurship tasks</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td><strong>Bee Equipment Manufacturer Level 3 modules</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UA/EM/3.1</td>
<td>Make frame bee hives</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>UA/EM/3.2</td>
<td>Make two in one bee suit (jacket and trouser)</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>UA/EM/3.3</td>
<td>Make bellow smoker with protective wire grid</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>UA/EM/3.4</td>
<td>Perform advanced entrepreneurship tasks</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td><strong>5 training modules (Level 1)</strong></td>
<td><strong>3 months</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>5 training modules (Level 2)</strong></td>
<td><strong>5 months</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>4 training modules (Level 3)</strong></td>
<td><strong>3 months</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note: It is understood that the average training duration is contact time (under structured training). Total contact training duration per week is assumed to be 5 days.
Job title: Bee Equipment Manufacturer

Occupational Level 1

Description: A bee equipment manufacturer level 1 is a person who makes beekeeping equipment from locally available and affordable materials. The materials used for making beekeeping equipment are easily accessed by the manufacturer e.g. they can be collected within the community.

Modules
1.1: Make basic bee protective gear
1.2: Make basic harvesting tools
1.3: Make traditional bee smoker
1.4: Produce traditional bee hives
1.5: Perform basic entrepreneurship tasks
MODULE 1.1:
Make basic bee protective wear

Module purpose: At the end of this module, the trainee will be able to make basic bee protective wear such as bee veil and footwear.

Approximate training duration of this module: 5 days (1 week)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercise:
1.1.1: Make a basic bee suit
1.1.2: Make foot wear
1.1.3: Make basic gloves (from polythene bags)
### Practical Exercise 1.1.1:
#### Make a basic bee suit

| Steps involved | 1. Prepare material e.g. by washing used maize/sugar bags  
|                | 2. Design a bee suit  
|                | 3. Measure and cut the material to the design and measurements chosen  
|                | 4. Sew the pieces to make a trouser and jacket  
|                | 5. Cut material for a veil and sew  
|                | 6. Fix a net around the hat  
|                | 7. Fix the veil material to the lower part of the hat  
|                | 8. Support the hat with flexible wire or sticks between the net and veil  
|                | 9. Fix round elastic rubber on lower part of the material  
|                | 10. Finish the basic bee suit e.g. by checking and mending any holes |

**Performance standards***:  
- Fitting honey bee suit that can protect a beekeeper from bee stings made with local materials

**Related knowledge**:  
- Explain honey bee defensive behavior  
- Discuss why beekeepers use bee suits  
- Describe the features of a bee suit  
- List the materials used in making bee suits  
- Explain why it is advisable to make a loosely fitting bee suit  
- Explain the use of flexible wire or stick in making of bee veil

**Required tools, equipment and materials**:  
- Used maize/sugar sacks, tape measure, scissors, hand needle/sewing machine, nylon thread, elastic, wire, hand gloves

**Safety concerns**:  
- Carefully use the hand needle or sewing machines to avoid injuries

**Errors****:  
- Financial losses  
- Bee stings  
- Injuries

*observable and measurable criteria, **what may result if incorrect decisions are made

---

### Practical Exercise 1.1.2:
#### Make foot wear

| Steps involved | 1. Measure materials e.g. used sugar sacks  
|                | 2. Make template for foot wear  
|                | 3. Cut material  
|                | 4. Sew material  
|                | 5. Fix elastic on top |

**Performance standards***:  
- Foot wear fits client  
- Quality foot wear made

**Related knowledge**:  
- Discuss why it is necessary to put on footwear/protective wear during apiary operations  
- Explain honey bee defensive behaviour  
- Describe the procedure of wearing the foot wear and the overall  
- Describe the procedure of making foot wear  
- List the materials required to make foot wear  
- Discuss the uses of foot wear
### Practical Exercise 1.1.3:  
**Make basic gloves from polythene bags**

| Steps involved | 1. Get polythene bags  
|                | 2. Prepare polythene bags e.g. by washing, cleaning, mending or tying  
|                | 3. Wear and tie around the hand |

| Performance standards* | Fitting gloves made from polythene bags |

| Related knowledge: | Explain bee defensive behaviour  
|                    | Discuss why bee keepers use bee hand gloves  
|                    | Describe features of bee hand gloves  
|                    | List the materials used in making bee hand gloves |

| Required tools, equipment and materials: | Polythene bags, scissors, string, rope/rubber |

| Safety concerns: | Bee stings if bee hand glove is not properly made |

| Errors**: | Bee stings  
|           | Injuries  
|           | Financial losses |

*observable and measurable criteria,  
**what may result if incorrect decisions are made*
MODULE 1.2:  
Make basic harvesting tools

Module purpose: At the end of this module, the trainee will be able to make basic bee hive products harvesting tools such as bee brushes e.g. bird quill feather brush and soft tree leaf brush.

Approximate training duration of module: 5 days (1 week)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
1.2.1: Make bird quill (feather) brush
1.2.2: Make soft tree leaf brush
Practical Exercise 1.2.1:
Make bird quill feather brush

Steps involved
1. Collect the quill feathers of a cock
2. Get small sisal string/rubber
3. Tie 2-3 quill feathers to make a bundle

Performance standards**:
- Two to three feathers tied firmly together

Related knowledge:
- Discuss the importance of a bee brush when working with bees
- Describe the characteristics of feathers to be used in making bird quill feather brush
- Explain how the bird quill feather brush is used
- Describe the process of making bird quill feather brush
- State the advantages and disadvantages of using bird quill feather brush
- Demonstrate the use of bird quill feathers brush

Required tools, equipment and materials:
- Quill feathers of domestic birds, string/rubber

Safety concerns:
- Only feathers from domestic birds should be used
- Ensure that the feathers used are free from mites

Errors*:
- Weak brushes that are not efficient may be produced
- Mite infestation in the bee hive

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 1.2.2:
Make soft tree leaf brush

Steps involved
1. Collect some soft tree leaves
2. Get a fibre/rubber
3. Tie the soft leaves together into small bundles
4. Use it to sweep bees off the honey comb into the bee hive
### Performance standards*

Quality soft tree leaf brush made

### Related knowledge:
- Discuss the importance of a bee brush
- Explain the materials for making bee brushes
- Describe how bee brushes can be made from leaves
- Explain why it is recommended that you use a leaf bee brush only once and throw
- Explain why it is preferred that soft tree leaf brushes are prepared as you are going to work in the apiary
- List the materials recommended to make soft tree leaf brush
- Discuss and demonstrate the uses of soft tree leaf brush

### Required tools, equipment and materials:
- Soft tree leaves, machete/panga, rubber/fiber

### Safety concerns:
- Poisonous and powdery tree leaves should not be used
- Bitter leaves should not be used
- Put on protective wear when operating in the apiary
- Burn leaves that have been used

### Errors**:
- Contamination of honey by bitter and poisonous tree leaves
- Injuries to bees and spread of bee pests and diseases if leaf brushes are reused

*observable and measurable criteria,  **what may result if incorrect decisions are made
MODULE 1.3:
Make a traditional bee smoker

Module purpose: At the end of this module, the trainees will be able to make different types of traditional (Ugandan) smokers using easily accessible local and affordable materials.

Approximate training duration of this module: 10 days (2 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
1.3.1: Make a tin bee smoker
1.3.2: Make a grass bee smoker
1.3.3: Make a clay pot bee smoker
Practical Exercise 1.3.1:
Make a tin bee smoker

| Steps involved | 1. Get an open tin/make it  
2. Make holes on the sides of the tin  
3. Fix a swinging handle on the tin  
4. Put burning charcoal in the tin  
5. Add smoking materials such as cow-dung/green grass to produce smoke  
6. Blow wind on the smoking material and fire e.g. by swinging the tin smoker to generate more smoke  
7. Put off the fire after completing the exercise |
| Performance standards* | • Functioning tin smoker |
| Related knowledge | • Discuss the honey bee defensive behavior  
• Explain why bee smokers are necessary in beekeeping  
• List types of bee smokers  
• Describe how tin smokers are made  
• Discuss possible risks when using a tin smoker  
• State the advantages and disadvantages of a tin smoker  
• List the materials required to make a tin smoker  
• Demonstrate the operation and use of a tin smoker  
• Explain why it is essential to extinguish the smoker after use |
| Required tools, equipment and materials | • Tins, nails, hammer, wire, fire, saw dust, cow/goat dung, gloves, apron |
| Safety concerns | • Use materials free from oil/ insecticides  
• Extinguish fire completely after use |
| Errors** | • Bee hives, vegetation and bees may be burnt  
• Environmental pollution  
• Bee deaths |

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 1.3.2:
Make a grass bee smoker

| Steps involved | 1. Collect dry and green grass  
2. Tie the dry and green grass in bundles  
3. Test the grass smoker by lighting  
4. Put off the fire after use  
5. Store grass for use |
| Performance standards* | • Reasonable sizes (can be handled) of bundles of green and dry grass tied together ready for smoke generation |
### Practical Exercise 1.3.3:

**Make a clay pot bee smoker**

**Steps involved:**
1. Get a small clay pot
2. Make some holes on the sides of the clay pot
3. Put charcoal/fire in the clay pot and add cow dung or green grass
4. Blow the charcoal with smoking material to generate smoke
5. Put off the fire after completing the exercise

**Performance standards:**
Functional clay pot

**Related knowledge:**
- Discuss the honey bee defensive behavior
- Explain why bee smokers are necessary in beekeeping
- List types of bee smokers
- Discuss the advantages and disadvantages of using a clay pot bee smoker
- Describe how to light a clay pot bee smoker
- Demonstrate the operation and use of a clay pot bee smoker

**Required tools, equipment and materials:**
- Clay pot, cow/goat dung, dry/green grass, sharp tool, water

**Safety concerns:**
- Put off the fire after completing the work
- Wear protective wear

**Errors:**
- Bee hives, bees and the vegetation may be burnt

---

*observable and measurable criteria,  **what may result if incorrect decisions are made*
MODULE 1.4:

Produce Traditional Bee Hives

Module purpose: At the end of this module, the trainee will be able to produce non-wooden bee hives such as log, clay, woven and bamboo bee hives.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
1.4.1: Make log bee hive
1.4.2: Make clay bee hive
1.4.3: Make woven bee hive
1.4.4: Construct bamboo bee hive (fixed comb hive)
Practical Exercise 1.4.1:
Make log bee hives

**Steps involved**
1. Prepare the materials e.g. by gathering tools
2. Cut log
3. Chop the inside parts of the cut log and make it hollow
4. Cut an opening for inspection
5. Bait the bee hive with beeswax or propolis
6. Fix hanging wires on the ends
7. Close both ends of the bee hive and make entrance holes on one side. The entrance holes should be 8mm in diameter (see figure 6)
8. Fix/engrave a label

**Performance standards***:
- Right size of entrance holes
- Inspection opening that can be easily closed made
- Hanging wires firmly fixed and greased
- No gaping holes

**Related knowledge**:
- Explain bee ecology and nesting
- Discuss the types of bee hives
- Discuss the materials for making bee hives
- State advantages and disadvantages of log bee hives
- List materials used in making log bee hives
- Describe the importance of keeping bees in bee hives
- Describe the different beekeeping systems

**Required tools, equipment and materials**:
- Hammer, nails, iron sheets, hand saw, tape measure, chisel, hinges, binding wire, bees wax, propolis, ball pen (BIC), labels, logs

**Safety concerns**:
- Be cautious of sharp equipment such as axe
- Put on safety protective boots and gloves

**Errors****: Accidents
- Poor quality bee hives

*observable and measurable criteria,  **what may result if incorrect decisions are made

Figure 6: The log hive
Practical Exercise 1.4.2: Make clay bee hives

**Figure 7: Clay pot hives**

| Steps involved | 1. Prepare clay soil e.g. by mixing clay with water  
|                | 2. Mould the clay pot bee hive  
|                | 3. Make holes on the pot bee hive  
|                | 4. Fix/engrave labels  
|                | 5. Burn the pot bee hive  
|                | 6. Make the cover for the inspection/harvesting opening |

| Performance standards* | • Well burnt clay pot bee hive (see figure 7)  
|                       | • Correct sizes of entrance holes  
|                       | • No visible cracks on the pot |

| Related knowledge: | • Explain bee ecology and nesting behavior  
|                    | • Discuss the types of bee hives  
|                    | • Discuss the materials for making bee hives  
|                    | • Explain the process of making clay bee hives  
|                    | • Discuss the advantages and disadvantages of clay bee hives  
|                    | • List the materials used in making clay bee hives  
|                    | • Describe the features of clay bee hives  
|                    | • Discuss the maintenance of clay bee hives |

| Required tools, equipment and materials: | • Hoe, spade, containers, firewood, fire source, grass, clay soil, water, ball pen (BIC), labels/nails/stick |

| Safety concerns: | • Put off fire after use  
|                 | • Put on protective wear |

| Errors**: | • Poor quality bee hives produced  
|          | • Honey bees fail to colonise bee hives  
|          | • Fire accidents |

*observable and measurable criteria, **what may result if incorrect decisions are made
Practical Exercise 1.4.3:
Make woven bee hives

Figure 8: Woven basket hive

Steps involved

1. Cut 9 to 11 pegs each 1 meter long
2. Cut flexible twigs e.g. by slicing bamboo or cutting papyrus reeds
3. Draw a circle on leveled ground of 30cm diameter
4. Fix the 9-11 pegs at intervals in the circle
5. Start weaving the pegs with twigs such as bamboo and papyrus reeds
6. Cut 2 round covers e.g. wood or plastic for the two ends
7. Drill entrance holes on one side (cover)
8. Close the woven bee hive with covers on the two sides
9. Wrap the bee hive with polythene, grass or banana fibre and tie with fibre or wire
10. Fix wires for hanging on the ends
11. Smear the bee hive with cow dung or clay soil to seal off any openings apart from entrance holes
12. Dry the bee hive
13. Bait the bee hive e.g. with propolis before deploying it

Performance standards*:

• The diameter of bee hives should be around 30cm and the length should be about 100cm. (see figure 8)
• All gaps should be filled by smearing with cow dung or clay soil

Related knowledge:

• Explain bee ecology and nesting behavior
• Discuss the types of bee hives
• Discuss the materials for making bee hives
• Describe the structure of woven bee hives
• List materials for making woven bee hives
• Discuss the procedure of making woven bee hives
• Discuss the advantages of the woven bee hives
• Discuss the disadvantages of the woven bee hives
• Describe the procedure of maintaining woven bee hives

Required tools, equipment and materials:

• Pegs, twigs e.g. sliced bamboo and papyrus reeds, cow dung/clay, panga/machete, water, knife, grass, polythene and fiber/ropes, labels

Safety concerns:

• Ensure that all materials remaining such as sliced bamboo are properly kept since they may be dangerous
• Put on protective wear

Errors**: 

• Bees fail to colonise bee hives
• Poor quality bee hive with big gaps that can allow pests and predators to attack bees

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 1.4.4:
Construct bamboo bee hive (fixed comb bee hive)

Steps involved
1. Cut bamboo pieces of 94 cm long
2. Split each cut bamboo into 4 to 6 pieces
3. Cut 2 round pieces of timber measuring 30cm in diameter
4. Drill 4 holes of 8 mm on one round piece of timber
5. Make an opening/window with knives, for harvesting/inspecting on the second round piece of timber
6. Fix the split pieces of bamboo to the two round timber ends e.g. by nailing the split bamboo to the 2 round pieces with 2.5cm nails (half inch)
7. Smear outside the structure made with cow dung to reduce the size of the gaps
8. Wrap the bee hive with materials like polythene, banana fibre, iron sheet or grass
9. Tie the bee hive with binding wire or fibre tightly
10. Fix the locking system on the opening for harvesting/inspection
11. Fix a label and store in a safe and pest free environment
12. Bait the bee hive with material e.g. propolis just before deployment

Performance standards*:
- Quality bamboo bee hive made ready for deployment
- All gaps on bee hive properly covered and smeared
- Recommended measurements adhered to

Related knowledge:
- Explain bee ecology and nesting behaviour
- Discuss the types of bee hives
- Discuss the materials for making bee hives
- List types of materials used in constructing bamboo bee hives
- Describe the shape of the bamboo bee hive
- State the advantages and disadvantages of bamboo bee hive

Required tools, equipment and materials:
- Hammer, nails, panga/machete, knife, tape measure, round wood, bamboo, cow dung, material for covering bee hive e.g. grass, polythene, fibre and iron sheet, protective wear

Safety concerns:
- Keep tools and materials in a safe place
- Put on protective wear such as gloves to avoid injuries

Errors**:
- Bee hives with large gaps resulting in low colonization levels
- High levels of abscondment

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 1.5:
Perform basic entrepreneurship tasks

Module purpose: At the end of this module, the trainee will be able to perform basic salesmanship and customer care tasks as well as generate basic financial records.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
1.5.1: Perform basic salesmanship tasks
1.5.2: Generate basic financial records
1.5.3: Provide basic customer care
### Practical Exercise 1.5.1:

**Perform basic salesmanship tasks**

<table>
<thead>
<tr>
<th>Steps involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Advertise bee equipment and tools</td>
</tr>
<tr>
<td>2. Conduct basic market research</td>
</tr>
<tr>
<td>3. Display bee equipment and tools</td>
</tr>
<tr>
<td>4. Apply basic communication skills</td>
</tr>
<tr>
<td>5. Negotiate prices for bee equipment and tools</td>
</tr>
<tr>
<td>6. Cost bee equipment and tools</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance standards*</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High sales of bee equipment and tools</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related knowledge:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Describe how to start a bee equipment and tools manufacturing business</td>
</tr>
<tr>
<td>• Describe how to manage a bee equipment and tools manufacturing business</td>
</tr>
<tr>
<td>• State factors that influence success of a bee equipment and tools manufacturing business</td>
</tr>
<tr>
<td>• Define a customer</td>
</tr>
<tr>
<td>• Define a business enterprise</td>
</tr>
<tr>
<td>• Illustrate an organization structure of a business enterprise</td>
</tr>
<tr>
<td>• Discuss the roles of different stakeholders in a business</td>
</tr>
<tr>
<td>• Explain characteristics of an entrepreneur</td>
</tr>
<tr>
<td>• Discuss types of bee equipment and tools</td>
</tr>
<tr>
<td>• State the methods used in market research</td>
</tr>
<tr>
<td>• Discuss the importance of customer care</td>
</tr>
<tr>
<td>• List the methods of advertisement</td>
</tr>
<tr>
<td>• Describe how to measure customer satisfaction</td>
</tr>
<tr>
<td>• Discuss negotiating skills</td>
</tr>
<tr>
<td>• Describe the procedure of costing bee equipment and tools</td>
</tr>
<tr>
<td>• List the methods of handling customer complaints</td>
</tr>
<tr>
<td>• State the importance of tax payment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required tools, equipment and materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Paper, pens, telephone, computer, printer, racks, bill boards as sign posts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety concerns:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Observe safety and environmental precautions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Errors**</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Low sales</td>
</tr>
<tr>
<td>• Losses in business</td>
</tr>
<tr>
<td>• No or few customers attracted to the business</td>
</tr>
</tbody>
</table>

*observable and measurable criteria, **what may result if incorrect decisions are made*

### Practical Exercise 1.5.2:

**Generate basic financial records**

<table>
<thead>
<tr>
<th>Steps involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Develop a simple budget</td>
</tr>
<tr>
<td>2. Develop a simple income statement</td>
</tr>
<tr>
<td>3. Develop a simple expenditure statement</td>
</tr>
<tr>
<td>4. Develop income-expenditure records</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance standards*</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Well-developed and maintained financial records</td>
</tr>
</tbody>
</table>
### Related knowledge:
- State success factors of a beekeeping business
- Define an income statement
- Define an expenditure statement
- Describe the procedure of developing an income statement
- Describe the procedure of developing an expenditure statement
- Define a successful business enterprise
- State types of financial records used in making bee equipment and tools
- State the importance of financial records
- Describe the procedure of costing bee equipment and tools

### Required tools, equipment and materials:
- Paper, pens, telephone, computer, printer

### Safety concerns:
- Observe safety and environmental precautions

### Errors**:
- Financial losses in the business
- Low/over costed bee equipment and tools

*observable and measurable criteria, **what may result if incorrect decisions are made

---

### Practical Exercise 1.5.3:
**Provide basic customer care**

#### Steps involved
1. Promote customer relations
2. Receive and respond to customer complaints
3. Provide information to customers
4. Conduct business evaluation
5. Offer after sales service

#### Performance standards*:
- Satisfied customers
- Growing business

#### Related knowledge:
- Describe how to retain customers
- Describe how to manage a bee equipment and tools manufacturing business
- State success factors of a bee equipment and tools manufacturing business
- Define customer relations
- Explain factors influencing the success of a business in bee equipment and tools manufacturing
- Discuss the importance of customer care
- Describe how to measure customer satisfaction
- Discuss how to evaluate a bee equipment and tools manufacturing business

#### Required tools, equipment and materials:
- Paper, pens, telephone

#### Safety concerns:
- Observe safety and environmental precautions

#### Errors**:
- Low sales
- Losses in business
- Low customer retention

*observable and measurable criteria, **what may result if incorrect decisions are made
Job title: Bee Equipment Manufacturer

Occupational Level 2

Description: A bee equipment manufacturer level 2 is a person who makes improved beekeeping equipment using improved technology.

Modules
2.1: Make transitional bee hives (e.g. top bar bee hives, Johnson bee hives, improved traditional bee hives)
2.2: Make bellow smokers (bee smokers)
2.3: Make bee hive tools
2.4: Make Bee suit and hand gloves
2.5: Perform moderate entrepreneurship tasks
MODULE 2.1:

Make transitional bee hives (top bar hives, Johnson bee hives, improved traditional bee hives)

Module purpose: At the end of this module, the trainee will be able to make different types of transitional bee hives that include top bar bee hives, Johnson bee hives and improved traditional bee hive.

Approximate training duration of this module: 40 days (8 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.1.1: Make a top bar bee hive
2.1.2: Make a Johnson bee hive
2.1.3: Make an improved traditional bee hive
Practical Exercise 2.1.1:
Make a top bar bee hive

Figure 12: Dimensions of a KTB hive

Figure 13: Types of top bars: T-shaped, V-shaped, Grooved-top bar and half round top bar

Steps involved
1. Prepare quality materials (dry timber)
2. Measure and cut the timber following the dimensions of a KTB bee hive (figure 12)
3. Smoothen the timber
4. Join the timber into a box following dimensions of KTB hive using nails
5. Measure and cut the timber to make top bars (figure 13)
6. Construct the lid
7. Drill entrance
8. Fix/engrave a label
9. Bait the bee hive using material such as propolis or beeswax just before deployment

Performance standards*:
• Top bar bee hive made according to recommended dimensions
• Well constructed and baited bee hive ready for deployment

Related knowledge:
• Discuss honey bee nesting behavior
• Explain the importance of bee space
• Describe the structure of top bar bee hives
• State the advantages and disadvantages of top bar bee hives
• List the materials used in the construction of top bar bee hives
• Describe the procedure of making top bar bee hives
• Explain the importance of beekeeping using top bar hives
• Describe the different beekeeping systems
• Discuss the different beekeeping technologies (bee hive types) used in different regions of Uganda and their benefits.
### Practical Exercise 2.1.2:
### Make Johnson bee hive

**Steps involved**

1. Prepare the materials e.g. by seasoning timber
2. Measure the materials and cut according to the standard measurements of Johnson bee hive
3. Join the material e.g. timber using nails following Johnson bee hive dimensions and description (door measure 30 x 30cm, side measure 91 x 30 cm, top board measures 97 x 30 cm with iron sheet cover, bottom measure 91 x26 cm), with the queen excluder placed in the middle of the hive across
4. Drill the entrance on either side of the excluder on one side of the bee hive
5. Construct the bee hive cover
6. Fix a loop or string on the ends of the bee hive for hanging
7. Bait the bee hive
8. Cover the top of the bee hive with its cover and it will be ready for deployment (see figure 14)
9. Label the hive

**Performance standards***:

- Bee hive conforming to standard dimensions of Johnson bee hive made ready for deployment

**Related knowledge**:

- Discuss bee nesting behavior
- Explain the different types of bee hives
- Describe the structure of Johnson bee hive
- State the advantages and disadvantages of using Johnson bee hive
- List the materials used in the construction of Johnson bee hive
- Discuss the features of an appropriate bee hive
Required tools, equipment and materials:

- Hammer, nails, iron sheets, glass/polythene, bamboo sticks/papyrus, timber, hand saw, binding wires, wood glue, gloves and apron, labels/engraving machine

Safety concerns:

- Clean the site after completing bee hive construction to avoid accidents from sharp objects such as iron sheets
- Put on protective wear

Errors**:

- Poor quality bee hives that may not be colonized
- Loss of finances
- High bee abscondment levels

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 2.1.3:

Make an improved traditional bee hive

Steps involved

1. Prepare the materials e.g. collecting bamboo or twigs from the forest/buy from the market
2. Split and cut materials/bamboo to standard dimensions
3. Make two cycles of 30cm diameter from bundles of flexible materials/twigs for the 2 ends or cut them from wood
4. Join the materials/bamboo pieces to the cycles e.g. using nails or fibre
5. Cut 2 round pieces from materials e.g. wood/metal sheet for the two ends
6. Drill entrance holes (8 mm diameter) on the wood/metal sheet for one end
7. Fix the 2 ends with a hinge
8. Smear any remaining gaps with cow dung or clay and dry the hive
9. Cover the bee hive with iron sheet or grass and tie tightly
10. Label the hive
11. Bait the bee hive e.g. by using propolis or beeswax for deployment

Performance standards*:

- Well constructed bee hive conforming to standards ready for deployment

Related knowledge:

- Discuss bee nesting behavior
- Explain the different types of bee hives
- Describe the structure of traditional bee hive
- List the advantages and disadvantages of traditional bee hive
- State the advantages and disadvantages of traditional bee hive
- List the materials used in the construction of traditional bee hives

Required tools, equipment and materials:

- Hammer, nails, panga/machete, hand saw, iron sheets, timber, scissors, bamboo, polythene, banana fiber, grass, cow dung/clay soil, protective wear, labels

Safety concerns:

- Ensure that the site is cleaned and materials stored after completing bee hive making to avoid injuries from sharp objects such as iron sheets and bamboo
- Put on protective wear

Errors**:

- Injuries
- Poor quality bee hives that may not be colonized
- Loss of finances

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 2.2:

Produce bellow smokers (bee smokers)

Module purpose: At the end of this module, the trainee will be able to make different parts of a bee smoker and assemble them into an efficient bellow smoker.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.2.1: Make a bee smoker nozzle
2.2.2: Make a bee smoker cylinder
2.2.3: Make a bee smoker pump
Practical Exercise 2.2.1:
Make a bee smoker nozzle

Steps involved:
1. Collect materials required e.g. metal sheet
2. Measure the materials
3. Cut the materials
4. Make the bee smoker nozzle e.g. by curving/folding the material (see figure 16)
5. Curve the material to the correct shape of the nozzle

Performance standards*:
• Right measurements and shape of the nozzle made

Related knowledge:
• Discuss honey bee defensive behavior
• Explain why smoking is done in beekeeping
• Describe the components of a bee smoker
• Describe the procedure for making a bee smoker nozzle
• List the materials used for making a bee smoker nozzle
• State the function of a bee smoker nozzle on a bee smoker

Required tools, equipment and materials:
• Plane metal sheet, scissors, maker, pliers, hammer, rail line bar, gloves and leather gown/ apron

Safety concerns:
• Wear leather gown and gloves

Errors**:
• Loss of finances
• Poor quality nozzles made

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 2.2.2:
Make a bee smoker cylinder

Steps involved:
1. Collect material e.g. plane metal sheet
2. Measure and cut the material
3. Curve the material to make the shape of a cylinder
4. Close the bottom
5. Finish the bee smoker cylinder e.g. by smoothening the edges
### Performance standards*
- Well made bee smoker cylinders conforming to the dimensions

### Related knowledge:
- Explain honey bee defensive behavior
- Discuss why bee smokers are used in beekeeping
- Describe the process of making a bee smoker cylinder
- List the materials used for making a bee smoker cylinder
- State the functions of a cylinder on a bee smoker

### Required tools, equipment and materials:
- Plane metal sheet, scissors, maker, pliers, hammer, rivets, rail line bar, gloves, apron

### Safety concerns:
- Wear leather gown/apron and gloves during the process of making bee smoker cylinder

### Errors**:
- Financial losses
- Poorly made bee smoker cylinders leading to lack of market
- Fire accidents

*observable and measurable criteria,  **what may result if incorrect decisions are made

## Practical Exercise 2.2.3:
### Make a bee smoker pump

| Steps involved | 1. Collect materials required e.g. wood/timber and leather/canvas  
|                | 2. Measure and cut the materials  
|                | 3. Fix the spring  
|                | 4. Fix the leather  
|                | 5. Pin the leather canvas to the bee smoker cylinder  
|                | 6. Assemble the parts of the bee smoker (nozzle, cylinder and pump)  
|                | 7. Fix the handle  
|                | 8. Finish the bee smoker e.g. by smoothening any protruding parts  
|                | 9. Fix/engrave label |

### Performance standards*
- Quality and functioning bee smoker pump made

### Related knowledge:
- Explain honey bee defensive behavior
- Discuss why bee smokers are used in beekeeping
- Describe the process used for making a bee smoker pump
- List the materials used for making a bee smoker pump
- State the advantages and disadvantages of using a bee smoker

### Required tools, equipment and materials:
- Timber, spring, pins, leather, bolts, glue, binding tape, drill bits spanners, tape measure, pencil/marker, leather gloves and apron, labels/engraving machine

### Safety concerns:
- Wear leather gloves and apron during bee smoker manufacture

### Errors**:
- Financial losses
- Poor quality smokers that do not attract customers
- Accidents

*observable and measurable criteria,  **what may result if incorrect decisions are made
MODULE 2.3:

Produce bee hive tools

Module purpose: At the end of this module, the trainee will be able to make different bee hive tools such as bee brushes and hive tools.

Approximate training duration of this module: 5 days (1 week)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.3.1: Make a bee brush
2.3.2: Make a hive tool
Practical Exercise 2.3.1:
Make a bee brush

Steps involved
1. Cut sisals into recommended lengths
2. Cut and design a piece of timber handle
3. Cut bicycle spokes and hammer them to make U-nails
4. Fix the sisal bristles on the timber/handle using the U-nails to make the brush
5. Finish the bee brush e.g. by trimming off excess bristles (see figure 17)
6. Fix/engrave a label

Performance standards*
• Soft brush that is harmless to bees made

Related knowledge:
• Explain honey bee defensive behavior
• Discuss why bee brushes are used in beekeeping
• Describe the best type of timber recommended to make a bee brush
• List the materials used to make a bee brush
• Describe application of different materials in the making of a bee brush
• State the advantages and disadvantages of different materials used for making bee brushes

Required tools, equipment and materials:
• Hammer, plane, hand saw, U-nails, bristles e.g. sisal, timber, sand paper, oil stone, panga/machete, drill, gloves, apron, labels/engraving machine

Safety concerns:
• Put on protective wear to avoid injuries

Errors**: 
• Bees might be killed when a hard brush (material) is used (only soft smooth material recommended)
• Financial losses

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 2.3.2:
Make a bee hive tool

Steps involved
1. Measure and cut a flat metal 1.5mm thick and 30 cm long
2. Curve one end point at 2cm length at a right angle
3. Drill a hole in the middle extreme and near the curve
4. Sharpen the two ends
5. Finish the hive tool e.g. by smoothening the ends (see figure 18)
6. Fix/engrave a label

Figure 18: Hive tool
<table>
<thead>
<tr>
<th><strong>Performance standards</strong>*</th>
<th>A well made hive tool conforming to standard measurements produced</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Related knowledge:</strong></td>
<td>• Explain honey bee defensive behavior</td>
</tr>
<tr>
<td></td>
<td>• Discuss the use of propolis by honey bees</td>
</tr>
<tr>
<td></td>
<td>• Explain the uses of hive tools in beekeeping</td>
</tr>
<tr>
<td><strong>Required tools, equipment and materials:</strong></td>
<td>Hack saw blade, flat metal, file, grinding stone, crump, drill, tape measure, gloves, apron, labels/engraving machine</td>
</tr>
<tr>
<td><strong>Safety concerns:</strong></td>
<td>• Wear leather gloves, glasses and an apron</td>
</tr>
<tr>
<td></td>
<td>• Be careful during operations to avoid accidents</td>
</tr>
<tr>
<td></td>
<td>• Collect and store remaining materials properly to avoid accidents</td>
</tr>
<tr>
<td><strong>Errors</strong></td>
<td>• Financial losses</td>
</tr>
<tr>
<td></td>
<td>• Poor quality hive tools made which may not attract customers</td>
</tr>
<tr>
<td></td>
<td>• Accidents</td>
</tr>
</tbody>
</table>

*observable and measurable criteria,  **what may result if incorrect decisions are made*
MODULE 2.4:

Produce bee suit and hand gloves

Module purpose: At the end of this module, the trainee will be able to make a bee suit and hand gloves.

Approximate training duration of this module: 15 days (3 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.4.1: Make hand wear (gloves)
2.4.2: Make a basic bee suit
Practical Exercise 2.4.1:
Make hand wear (gloves)

Steps involved
1. Measure the material e.g. cloth/latex material
2. Cut the material
3. Sew the material (pairs)
4. Fix elastic/rubber at one end
5. Finish the gloves (see figure 19)
6. Fix a label

Performance standards*:
- Hand gloves that fit the hands are made

Related knowledge:
- Explain honey bee defensive behavior
- Describe the purpose of hand wear
- List the recommended material in making hand wear
- Describe the procedure of making hand wear

Required tools, equipment and materials:
- Cloth material/latex material/rubber/elastic, tape measure, scissors, thread, needle, sewing machine, safety pin, labels

Safety concerns:
- Carefully use the needle, scissors and sewing machines to avoid injuries

Errors**:
- Financial losses
- Injuries
- Bee stings

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 2.4.2:
Make a bee suit

Steps involved
BEE VEIL
(1)
(i). Cut 2 round pieces of materials of diameter 18cm for the top of hat
(ii). Cut 4 pieces of material for the side of the hat
(iii) Cut 2 round pieces of material for the hat base (circular and hole of 17cm in the middle)

(2)
(i). Sew together 1 round top piece, 2 side pieces and 1 base piece to make a hat
(ii). Make a second hat
(iii). Fit 2 hats together and fold the base over a ring wire of 125cm circumference and sew
THE NATIONAL BEEKEEPING TRAINING AND EXTENSION MANUAL

(3)
(i). Cut a black net of size 63 cm x 31 cm
(ii). Cut a material of size 67cm x 31 cm
(iii). Sew the material and the net at either side of 31cm to make it round
(iv). Cut material of size 160cm x 11 cm. Fold it into 2 to make 160 cm x 5.5 cm and sew all round the above net and cloth
(v). Then fix 2 self locking jacket zips of 56cm starting in the middle back on either sides
(vi). Then sew the whole piece on the hat
(vii). Put another ring wire 15cm from the hat and sew over it a material of 160cm x 5cm

OVERALL
1. Get a piece of material 160cm x 90 cm then fold it into 2 to get 45cm x 160cm
You have to get 2 pieces one for the left side and another for the right side
2. Get a piece of material of size 80cm x 76cm and fold it into 2 to get 80cm x 38cm
You get 2 pieces for both hands
3. Cut 2 pieces of size 26cm x 29 cm for the down pockets
4. Then cut 1 piece of size 13cm x 18cm for the upper pocket and cut a covering flap of 18cm x 19cm and fold into 2 to get 9cm x 19cm and fix a stick- on ‘kamatta’
5. Start sewing the left and right pieces in No.1 at the back and thighs and then fix a zip of 76cm at the front
6. Fix a collar according to the size of the overall
7. Then fix the 2 down pockets and one upper pocket
8. Put elastic at the end of the arms legs and back
9. Fix the covering flap on the upper pocket
10. Sew the second part of the zip from the veil
11. Put flap with stick-on ‘kamatta’ at the front and back when the zip starts and end
12. Fix a label

Performance standards*:
- Fitting honey bee suit that can protect a beekeeper from bee stings made with khaki cloth materials

Related knowledge:
- Explain honey bee defensive behavior
- Discuss why beekeepers use bee suits
- Describe the features of a bee suit
- List the materials used in making bee suits
- Explain why it is advisable to make a loosely fitting bee suit
- Explain the use of flexible wire or stick in making of bee veil

Required tools, equipment and materials:
- Used khaki cloth material, tape measure, scissors, hand needle/ sewing machine, nylon thread, elastic, wire, hand gloves, labels

Safety concerns:
- Carefully use the hand needle or sewing machines to avoid injuries

Errors**:
- Financial losses
- Bee stings
- Injuries

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 2.5:
Perform moderate entrepreneurship tasks

Module purpose: At the end of this module, the trainee will be able to perform moderate salesmanship and customer care tasks as well as marketing of bee equipment and tools.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.5.1: Perform moderate salesmanship tasks
2.5.2: Perform marketing tasks
2.5.3: Provide customer care
Practical Exercise 2.5.1:
Perform moderate salesmanship tasks

Steps involved
1. Develop a business plan
2. Develop sales proposals
3. Apply communication skills
4. Maintain sales records
5. Update financial records
6. Update administrative records
7. Supervise subordinates
8. Prepare work schedules

Performance standards*:
• High sales of bee equipment and tools
• Successful beekeeping business

Related knowledge:
• Discuss business laws
• Describe the principles of budgeting
• Discuss the constituents of financial statements
• Explain the key considerations for starting up a bee equipment and tools manufacturing business
• Discuss the challenges in running a bee equipment and tools manufacturing business
• Explain the purpose of developing a business plan
• List the components of a business plan
• Discuss sources of funding
• List the components of a sales proposal
• Discuss hiring and managing people
• Describe the procedure of updating financial records
• Discuss types and channels of communication
• List the types of financial and administrative records used in bee equipment and tools manufacturing business

Required tools, equipment and materials:
• Paper, pens, computer, printer, telephone

Safety concerns:
• Observe safety and environmental precautions

Errors**:
• Low sales
• Losses in business
• No or few customers attracted to business

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 2.5.2:
Perform marketing tasks

Steps involved
1. Advertise bee equipment and tools
2. Conduct market research
3. Develop a marketing strategy

Performance standards*:
• Increased sales
### Practical Exercise 2.5.3:

**Provide customer care**

| Steps involved | 1. Advise clients  
|                | 2. Promote client relations  
|                | 3. Provide after sales services  
|                | 4. Conduct service evaluation  
|                | 5. Practice communication techniques |

**Performance standards***:  
- Satisfied customers  
- Growing business

**Related knowledge**:  
- Describe how to retain customers  
- Describe how to manage a bee equipment and tools manufacturing business  
- State factors that influence the success of a bee equipment and tools manufacturing business  
- Define customer relations  
- Explain factors that can lead to a successful bee equipment and tools manufacturing business  
- Discuss the importance of customer care  
- Describe how to measure customer satisfaction  
- Discuss how to evaluate a bee equipment and tools manufacturing business  
- List the methods of handling customer complaints

**Required tools, equipment and materials**:  
- Paper, pens, telephone

**Safety concerns**:  
- Observe safety and environmental precautions

**Errors***:  
- Financial losses in business  
- Low sales of bee equipment and tools

---

*observable and measurable criteria, **what may result if incorrect decisions are made*
Job title: Bee Equipment Manufacturer

Occupational Level 3

Description: A bee equipment manufacturer level 3 is a person who makes improved beekeeping equipment using highly improved technology.

Modules
3.1: Make frame bee hives
3.2: Make two-in-one bee suit (jacket and trouser)
3.3: Make bellow smoker with protective wire grid
3.4: Perform advanced entrepreneurship tasks
MODULE 3.1:
Make frame bee hive

Module purpose: At the end of this module, the participants will be able to make frame bee hives. S/he will also be able to prepare and install these bee hives.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]
Practical Exercise 3.1.1:
Make frame bee hive

Steps involved

1. Prepare materials e.g. acquire seasoned timber
2. Plane timber to uniform thickness of 2cm
3. Measure and cut timber according to dimensions
4. Split the cut timber to the standard dimensions
5. Rivet timber for joining
6. Join pieces of timber to form the brood box
7. Join pieces of timber to form the super box
8. Cut wire mesh and frame with wood to make the queen excluder
9. Assemble top cover
10. Drill entrance holes on the brood box
11. Measure and cut timber for making frames
12. Assemble pieces of timber to make frames
13. Fix wires into frames (see fig 23)
14. Prepare wax foundation sheets
15. Measure and cut out space bars to separate frames
16. Fix space bars on brood and super boxes
17. Measure, cut and join timber pieces following the dimensions to make the base
18. Assemble the bee hive in the following sequence: brood chamber, queen excluder, super chamber and top cover
19. Paint outside the bee hive with light colours
20. Fix/engrave a label
<table>
<thead>
<tr>
<th>Performance standards*</th>
<th>Seasoned timber • Accurate measurements • Fresh foundation sheets used • Stainless wires gauge 0.48mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related knowledge</td>
<td>Discuss honey bee nesting ecology • Explain the bee hive types used and advantages for each type • Discuss the advantages of using frame bee hives • Discuss the disadvantages of using frame bee hives • Explain the quality and species of timber for bee hive making • Explain how bees are managed in frame bee hives • Discuss how baiting can be done in frame bee hives • List materials used for bee hive baiting</td>
</tr>
<tr>
<td>Required tools, equipment and materials:</td>
<td>Wood/timber, nails, plane metal sheet, wire mesh, tack nails, scissors, drill bits, hammer, hand brace, work bench, tape measure, pencil, planing machine, chisel, circular saw/electric, sand paper, paint, gloves, apron, labels/engraving machine</td>
</tr>
<tr>
<td>Safety concerns:</td>
<td>Wear safety gear • Clean the site and store the materials properly after bee hive construction to avoid injuries</td>
</tr>
<tr>
<td>Errors**:</td>
<td>Loss of resources e.g. human resource and materials • Loss of finances • Poor quality bee hives that may not be colonized</td>
</tr>
</tbody>
</table>

*observable and measurable criteria, **what may result if incorrect decisions are made
**MODULE 3.2:**

**Make two-in-one bee suit (a jacket and trousers)**

*Module purpose:* At the end of this module, the participants will be able to make two-in-one bee suit (jacket and trouser)

*Approximate training duration of this module:* 10 days (2 weeks)

*[It is understood that the average training duration is contact time (training under trainer’s guidance)]*
Practical Exercises: 3.2.1:
Make two-in-one suit

Steps involved

1. Prepare materials e.g. by buying cloth and nets
2. Design a bee suit
3. Measure and cut the material to the design and measurements chosen
4. Sew the pieces to make a trouser and jacket
5. Measure and cut the material for a veil and sew
6. Fix a net around the hat
7. Fix the veil material to the lower part of the hat
8. Support the hat with flexible wires or sticks between the net and veils
9. Fix round elastic rubber on lower part of the jacket
10. Finish the bee suit e.g. by checking and mending any holes (see figure 25)

Performance standards*

• Use light colored material e.g. white
• Follow the measurements accurately

Related knowledge

• Discuss honey bee defensive behavior
• Explain the importance of bee suits in beekeeping
• Describe the types of materials and colors used for making bee suits
• Explain the types of nets used for making the bee-veil
• Describe other materials used for making the bee suits such as the wires, zips and elastic materials

Required tools, equipment and materials:

• Cloth, thread, scissors, zip, wire, net, tape measure, sewing machine, elastic material, hat, gloves, apron, khaki material, tape measure, scissors, hand needles/sewing machine, threads. Elastic wire, net and zip, labels

Safety concerns

• Clean the work place and store materials and tools properly
• Be careful during the process of bee suit making to avoid injuries
• Install a fire extinguisher in the bee suit making environment
• Carefully use of the sewing machine to avoid injuries

Errors**: 

• Loss of resources such as materials and human resource
• Financial losses
• Poor quality protective gear that may allow bee stings
• Injuries
• Suit not used

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 3.3:

Make Bellow Smoker with grid

Figure 26: Making a bee smoker with grids

Module purpose: At the end of this module, the trainee will be able to make bellow smoker with grid

Approximate training duration of this module: 10 days (2 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]
Practical Exercise 3.1.1:
Make bellow smoker with grid

Figure 27: A bee smoker with grids

Steps involved
- 1. Collect materials required e.g. metal sheet
- 2. Measure the materials
- 3. Cut the materials
- 4. Make the bee smoker nozzle e.g. by curving/folding the material
- 5. Curve the material to the correct shape of the nozzle
- 1. Measure and cut the material for cylinder
- 2. Curve the material to make the shape of a cylinder
- 6. Close the bottom of the cylinder
- 7. Measure and cut the materials for making the pump
- 8. Fix the spring
- 9. Fix the leather
- 10. Pin the leather to the bee smoker cylinder
- 11. Assemble the parts of the bee smoker (nozzle, cylinder and pump)
- 12. Fix the handle
- 13. Finish the bee smoker e.g. by smoothening any protruding parts (see figure 27)
- 14. Fix/engrave a label

Performance standards*:
- Accurate dimensions taken
- Use recommended materials e.g. plane metal sheet

Related knowledge
- Explain the importance of a bee smoker
- Describe materials for making bee smokers
- List the types of bee smokers
- Explain the advantages of using bellow smokers
- Discuss components of bellow smokers
- Explain materials for making bellow smokers
- Describe the procedure for making bellow smokers
- Explain how bellow smokers work

Required tools, equipment and materials:
- Galvanized iron sheet, pliers, tape measure, welding machines, curving machine, hammer, nails, leather material, gloves, eye glasses, apron, labels

Safety concerns
- Wear safety gear and keep a first aid box within the work premises
- Clean work place and store materials properly to avoid accidents

Errors**:
- Loss of resources e.g. materials
- Accidents e.g. cuts
- Financial losses

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 3.4:

Perform advanced entrepreneurship tasks

Module purpose: At the end of this module, the trainee will be able to prepare business plans and analyze profits from the business.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.4.1: Prepare a business plan
3.4.2: Prepare a profitability analysis

Figure 28: Analyzing sales and profits from the business
**Practical Exercise 3.4.1:**

**Prepare a business plan**

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Decide the form of business (choose your business type/category)</td>
<td></td>
</tr>
<tr>
<td>• Define the mission and vision of the business</td>
<td></td>
</tr>
<tr>
<td>• Decide the objectives of the business</td>
<td></td>
</tr>
<tr>
<td>• Understand your financial options (requirements)</td>
<td></td>
</tr>
<tr>
<td>• Decide on the business structure (organogram)</td>
<td></td>
</tr>
<tr>
<td>• Decide on the marketing strategy to be employed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance standards*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• A completed standard business plan</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related knowledge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Explain how to conduct market research</td>
<td></td>
</tr>
<tr>
<td>• Discuss how to calculate profit and loss</td>
<td></td>
</tr>
<tr>
<td>• Explain how to develop cash flow statement</td>
<td></td>
</tr>
<tr>
<td>• Explain how to budget</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required tools, equipment and materials:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Computer, printer, telephone, paper, pen</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety concerns</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Clear and organize your working environment</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Errors**:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Financial losses</td>
<td></td>
</tr>
<tr>
<td>• Wrong target market and failure of the business to grow</td>
<td></td>
</tr>
</tbody>
</table>

*observable and measurable criteria, **what may result if incorrect decisions are made

---

**Practical Exercise 3.4.2:**

**Prepare a profitability analysis**

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify costs involved in the business</td>
<td></td>
</tr>
<tr>
<td>• List down the revenue sources of the business and amounts</td>
<td></td>
</tr>
<tr>
<td>• Calculate the profit by subtracting the total costs from the total revenue</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance standards*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Accurate profitability analysis report</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related knowledge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Explain the importance of record keeping</td>
<td></td>
</tr>
<tr>
<td>• Discuss how budgeting is done</td>
<td></td>
</tr>
<tr>
<td>• Describe how to calculate and determine taxes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required tools, equipment and materials:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Computer, printer, telephone, paper, pen</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety concerns</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Clear and organize the working environment</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Errors*:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Financial losses</td>
<td></td>
</tr>
<tr>
<td>• Over/under estimation of profits and losses</td>
<td></td>
</tr>
</tbody>
</table>

*observable and measurable criteria, **what may result if incorrect decisions are made
## Overview of modules for the beekeeper

<table>
<thead>
<tr>
<th>Code</th>
<th>Module Title</th>
<th>Average duration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Days</td>
<td>Weeks</td>
</tr>
<tr>
<td><strong>Beekeeper Level 1 modules</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UA/BK/1.1</td>
<td>Set up an apiary</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>UA/BK/1.2</td>
<td>Control bee pests, predators and diseases</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>UA/BK/1.3</td>
<td>Harvest honey</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>UA/BK/1.4</td>
<td>Perform basic entrepreneurship tasks</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td><strong>Beekeeper Level 2 modules</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UA/BK/2.1</td>
<td>Populate bee hives</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>UA/BK/2.2</td>
<td>Feed honey bees</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>UA/BK/2.3</td>
<td>Harvest hive products</td>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>UA/BK/2.4</td>
<td>Manage bee pests, predators and diseases</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>UA/BK/2.5</td>
<td>Perform moderate entrepreneurship tasks</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td><strong>Beekeeper Level 3 modules</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UA/BK/3.1</td>
<td>Rear queens</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>UA/BK/3.2</td>
<td>Harvest and store hive products</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>UA/BK/3.3</td>
<td>Prepare bee feeds</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>UA/BK/3.4</td>
<td>Manage bee diseases</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>UA/BK/3.5</td>
<td>Manage honey bees in frame bee hives</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>UA/BK/3.6</td>
<td>Perform advanced entrepreneurship tasks</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 training modules (Level 1)</td>
<td></td>
<td>3 months</td>
</tr>
<tr>
<td></td>
<td>5 training modules (Level 2)</td>
<td></td>
<td>5.5 months</td>
</tr>
<tr>
<td></td>
<td>6 training modules (Level 3)</td>
<td></td>
<td>5 months</td>
</tr>
</tbody>
</table>

Note: It is understood that the average training duration is contact time (under structured training). Total contact training duration per week is assumed to be 5 days.
Job title: Beekeeper

Occupational Level 1

Description:
A Beekeeper level 1 is a person who uses traditional bee hives and local techniques to harvest honey. S/he is able to set-up an apiary with the sole aim of collecting honey by applying elementary beekeeping techniques.

MODULES
1.1: Set up apiary
1.2: Control bee pests, predators and diseases
1.3: Harvest honey
1.4: Perform basic entrepreneurship tasks
MODULE 1.1:

Set up an apiary

Module purpose: At the end of this module, the trainee will be able to select, clear, fence and label an apiary. S/he will also be able to prepare and install bee hives.

Approximate training duration of this module: 15 days (3 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
1.1.1: Select apiary site
1.1.2: Clear apiary site
1.1.3: Prepare bee hives
1.1.4: Install bee hives
1.1.5: Fence off apiary
1.1.6: Label the apiary
## Practical Exercise 1.1.1:
### Select apiary site

| Steps involved | 1. Go to potential sites and make observations on key factors for an apiary site e.g. forage plants and water availability  
|                | 2. Choose the most appropriate site based on the observation(s) above |

<table>
<thead>
<tr>
<th>Performance standards*</th>
</tr>
</thead>
</table>
| Availability of bee forage and water  
| Site not water logged  
| Site having sufficient shade  

<table>
<thead>
<tr>
<th>Related knowledge</th>
</tr>
</thead>
</table>
| Define beekeeping  
| Define an apiary  
| Explain the importance of keeping bees  
| Describe the key factors for a good apiary site  
| Describe the different bee hive types  
| List the advantages and disadvantages of the different bee hive types  
| Describe bee forage plants  
| Explain the dangers of agricultural pesticides use on bees  

<table>
<thead>
<tr>
<th>Required tools, equipment and materials</th>
</tr>
</thead>
</table>
| Notebooks, pens, machetes/pangas, gumboots  

<table>
<thead>
<tr>
<th>Safety concerns</th>
</tr>
</thead>
</table>
| Put on gumboots and carry machete  

<table>
<thead>
<tr>
<th>Errors**</th>
</tr>
</thead>
</table>
| Accidents if apiary is sited near public dwellings  
| Incorrect siting resulting in low colonization rate or abscondment  
| Hives could fall down  

*observable and measurable criteria, **what may result if incorrect decisions are made

## Practical Exercise 1.1.2:
### Clear apiary site

| Steps involved | 1. Slash selected site  
|                | 2. Prune overhanging tree branches  
|                | 3. Remove cut grasses, tree branches and dry wood  
|                | 4. Level the ground e.g. by filling holes  

<table>
<thead>
<tr>
<th>Performance standards*</th>
</tr>
</thead>
</table>
| Undergrowth vegetation cleared to low level (below 2 inches)  

<table>
<thead>
<tr>
<th>Related knowledge</th>
</tr>
</thead>
</table>
| Explain why it is important to clear apiary site  
| Describe the procedure of clearing apiary site  

<table>
<thead>
<tr>
<th>Required tools, equipment and materials</th>
</tr>
</thead>
</table>
| Machetes, slashers, hoes, rakes, gumboots and apron  

<table>
<thead>
<tr>
<th>Safety concerns</th>
</tr>
</thead>
</table>
| Put on gum boots and gloves during apiary clearance  

<table>
<thead>
<tr>
<th>Errors**</th>
</tr>
</thead>
</table>
| Pest and predator infestation  
| Incidences of bush fire in the apiary resulting in damages to bee hives  
| Abscondment of honey bee colonies  
| Injuries  

*observable and measurable criteria, **what may result if incorrect decisions are made
Practical Exercise 1.1.3:

Prepare bee hives

Steps involved
1. Clean bee hives e.g. by brushing or burning grass inside
2. Label beehives
3. Bait bee hives
4. Close openings on the bee hives apart from bee entrances

Performance standards*
• Bee hives free from unwanted materials (clean bee hives)
• Hives well baited

Related knowledge:
• Explain the importance of cleaning bee hives
• Describe materials for baiting bee hives
• Explain qualities of good bee hives
• List the types of bee hives
• Describe how to attract bees into an empty bee hive

Required tools, equipment and materials:
• Brush, grass, fire for melting baiting material, pans, baiting materials e.g. beeswax and propolis, protective wear, labels

Safety concerns:
• Put on gloves during operations
• Avoid highly flammable substances in the scene

Errors**
• Low colonization rates
• Pest and predator infestation

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 1.1.4:

Install bee hives

Steps involved
1. Fix hive stands/platforms
2. Hang or place bee hives on stands or platforms
3. Slightly incline or tilt the bee hives (downwards) at entrances
4. Cover bee hives

Performance standards*
• Height of placement of bee hive - (1.5 meters for traditional bee hives and 0.7 meters for KTB and Langstroth)

Related knowledge:
• Explain the best height for bee hive placement
• Explain the effects of wind direction to bee hive placement
• Explain importance of shade in bee hive placement
• List the materials required in placing bee hives
• Explain why bee hives are hanged or placed on a platform or a stand and not on the ground

Required tools, equipment and materials:
• Hoes, machetes, poles, pickaxe, hammer, nails, grease/burnt oil, rat guard, gumboots, gloves and apron

Safety concerns:
• Put on gum boots and gloves while installing bee hives

Errors**
• Bee hives will not be colonized
• Pest, predator and disease infestation if bee hives are put on the ground
• Difficulty in management e.g. inspection

*observable and measurable criteria, **what may result if incorrect decisions are made
### Practical Exercise 1.1.5: Fence off apiary

**Steps involved:**
1. Demarcate the apiary
2. Fix the poles
3. Fix the barbed wires/plant live fence
4. Fix door and lock

**Performance standards:**
- A barrier to intruders constructed

**Related knowledge:**
- Describe honey bee defensive behavior
- List the types of fences/fencing materials
- Explain the importance of fencing off the apiary

**Required tools, equipment and materials:**
- Poles, machetes, hoe, pickaxe, barbed wire/fencing wires, nails, planting materials e.g. seeds, seedlings, cuttings, watering can, water, gloves, gumboots and overall

**Safety concerns:**
- Put on gumboots, gloves and overall for protection from injuries

**Errors:**
- Accidents/bee stings arising from intrusion by animals/people
- Thieves may steal bee hives and honey

---

### Practical Exercise 1.1.6: Label the apiary

**Steps involved:**
1. Design appropriate labels/sign posts
2. Make the labels/sign posts
3. Fix labels/sign posts

**Performance standards:**
- Clear and brief labels/sign posts made
- Labels and sign posts are well exposed/easy to view

**Related knowledge:**
- State reasons for labelling
- List types of labels/labelling materials
- Describe how to place labels

**Required tools, equipment and materials:**
- Poles, timber, nails, machete/panga, pick axe, paint, brush, cement, gravel, sand, protective wear

**Safety concerns:**
- Put on gloves, gumboots and overalls for protection from injuries

**Errors:**
- Misdirection of public
- Difficulty in tracing the apiary
- Sign posts/labels fall off
- Loss of colony/death of bees

---

*observable and measurable criteria, **what may result if incorrect decisions are made*
MODULE 1.2:

Control bee pests, predators and diseases

Module purpose: At the end of this module the trainee will be able to identify bee pests, predators and diseases. S/he will be able to control bee pests and predators by installing rat guards, greasing and applying used engine oil on hive stands. S/he will also be able to clean the apiary.

Approximate training duration of this module: 5 days (1 week)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
1.2.1: Identify bee pests, predators and diseases
1.2.2: Install rat guard
1.2.3: Clean apiary
1.2.4: Grease hive stands
1.2.5: Apply used engine oil on hive stands

Figure 30: Wax moth
Practical Exercise 1.2.1:
Identify bee pests, predators and diseases

Steps involved
1. Collect common bee pests, predators and diseased bees or brood
2. Observe and identify the pests, predators and diseases

Performance standards*:
• Common pests, predators and diseases identified

Related knowledge:
• Describe bee pests, predators and diseases known and their ecology
• Explain the effects of bee pests, predators and diseases on beekeeping
• Describe pests, predators and disease control options

Required tools, equipment and materials:
• Sample of pests, predators and diseases, bees/brood or pictures, magnifying glass, protective gear, bee smoker

Safety concerns:
• Avoid disposing live pests, predators and bee pathogens anywhere
• Put on gloves and face masks to avoid disease spread
• Put on bee protective gear during sample collection

Errors**:
• Spread of bee diseases/pests and predators
• Low honey productivity
• Abscondment

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 1.2.2:
Install rat guard

Steps involved
1. Cut the materials e.g. iron sheets/wire mesh
2. Shear the materials
3. Fix the material/guard on the hive stands

Figure 31: Installing rat guards
### Practical Exercise 1.2.3: Clean apiary

**Steps involved:**
1. Put on protective gear
2. Smoke all colonized bee hives
3. Slash the apiary
4. Prune overhanging tree branches
5. Remove cut grass and tree branches
6. Fill holes on the ground
7. Open bee hives and remove un-occupied combs
8. Close bee hives

**Performance standards***:**
- Height of undergrowth vegetation (Below 2 inches)

**Related knowledge:**
- Explain how environmental hygiene affects beekeeping
- Discuss the effects of having unoccupied combs in bee hives
- Explain the tools and process of cleaning the apiary

**Required tools, equipment and materials:**
- Machete/slasher, hoe, rake, protective gear, hive tool, bee smoker/fire and smoking material

**Safety concerns:**
- Put on protective gear during apiary cleaning

**Errors**
- Pests, predators and disease infestation
- Low colonization rates
- Abscondment
- Low hive productivity due to pest/predator attacks

---

*observable and measurable criteria,  **what may result if incorrect decisions are made*
Practical Exercise 1.2.4:

Grease hive stands

Steps involved
1. Dip a piece of cloth in grease
2. Tie the greased cloth on hive stands below the bee hive
3. Alternatively, smear grease around the stand below the bee hive or on the suspension wire

Performance standards*
• Well-greased bee hive stands or suspension wires

Related knowledge:
• Explain how bee pests and predators are controlled using grease
• Discuss the impact/effect of bee pests, predators on bee hive productivity
• Discuss the process of applying grease in pest control

Required tools, equipment and materials:
• Grease, a piece of cloth, protective gear

Safety concerns:
• Put on protective wear to avoid bee stings
• Avoid knocking bee hives or making unnecessary noise during apiary operations

Errors**
• Bee hives will be invaded by pests and predators such as ants
• Bee hive productivity will be lowered
• Abscondment may occur

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 1.2.5:

Apply used engine oil on hive stands

Steps involved
1. Dip a piece of cloth in burnt engine oil
2. Tie the cloth with burnt engine oil on the bee hive stands below the bee hives
3. Alternatively smear the bee hive stand 15 cm from the ground level with burnt engine oil

Performance standards*
• Burnt engine oil well positioned on hive stands
### Related knowledge:
- Describe the effects of burnt oil on insect pests
- Explain engine oil application in pest control

### Required tools, equipment and materials:
- Burn oil, brush, a piece of cloth, protective wear

### Safety concerns:
- Put on protective wear to avoid bee stings
- Avoid knocking bee hives and making unnecessary noise during apiary operations

### Errors**:
- Bee hives will be invaded by pest and predators such as ants
- Bee hive productivity will be lowered
- Abscondment may occur

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 1.3:
Harvest honey

Module purpose: At the end of this module, the trainee will be able to determine honey maturity and harvest good quality honey. In addition, s/he will be able to determine the moisture content of honey.

Approximate training duration of this module: 20 days (4 weeks)

It is understood that the average training duration is contact time (training under trainer’s guidance)

Practical Exercises:
1.3.1: Determine honey maturity
1.3.2: Light a bee smoker
1.3.3: Harvest honey

Figure 33: Harvesting from a traditional hive
### Practical Exercise 1.3.1:

**Determine honey maturity**

| Steps involved | 1. Light a bee smoker  
|                | 2. Put on protective gear  
|                | 3. Go to the apiary and make observations on bee flight activities, smell of honey in bee hive, bees crowding at hive entrance, check the weight of the bee hive  
|                | 4. Calm the bee by smoking gently  
|                | 5. Open the bee hive  
|                | 6. Make observations for sealed/capped combs  
|                | 7. Close the bee hive and plan/prepare to harvest the honey combs that are capped |

| Performance standards* | Mature honey harvested |

| Related knowledge: | Differentiate between ripe and unripe honey  
|                    | Explain the appropriate time for harvesting honey  
|                    | List the materials for lighting the bee smoker  
|                    | Describe the indicators of ripe honey  
|                    | Explain honey bee behavior  
|                    | Explain the floral calendar (see figure 34) |

![Figure 34: Illustration of the floral calendar](image)

| Required tools, equipment and materials: | Bee smoker, bee brush, hive tool or a knife, protective wear, torch/lamp, smoking material e.g. wood shavings, fire source |

| Safety concerns: | Wear protective gear  
|                 | Be calm and gentle when conducting operations in the apiary  
|                 | Have a burning bee smoker to calm the bees  
|                 | Put off fire after completing apiary operations |

| Errors**: | Poor quality honey  
|           | Abscondment  
|           | Bee deaths  
|           | Breakage of honey combs  
|           | Apiary damage/destruction by fire |

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 1.3.2:  
**Light a bee smoker**

| Steps involved | 1. Collect smoking material e.g. cow dung, wood shavings, sisal sack, grass etc  
2. Open the bee smoker  
3. Put some little smoking material in the smoker  
4. Light the material in the bee smoker and puff gently for the fire to catch well  
5. Add more smoking material  
6. Close the bee smoker  
7. Continue puffing to retain the fire in the smoker  
8. After use, pour out the remaining smoking material in the bee smoker and extinguish the fire by either covering it with soil or pouring water  
9. Ensure that the fire is completely put off before leaving the site |

| Performance standards* | • Gentle and cool smoke produced |

| Related knowledge | • List materials used in smoking  
• Explain why bees are smoked  
• Explain the effect of smoke on honey quality  
• Describe the process of smoking bees  
• Explain what causes bees to sting  
• Explain how to avoid bee stings  
• Describe how to manage bee stings  
• Explain how to treat bee stings  
• Explain bee defensive behaviour |

| Required tools, equipment and materials | • Bee smoker, lighting/smoking material, fire/match box, gloves |

| Safety concerns | • Put on gloves to avoid being burnt  
• Hold only the bee smoker handle when the smoker has been lit |

| Errors** | • You may burn the apiary  
• You may burn yourself  
• You may be stung by bees |

---

*observable and measurable criteria,  **what may result if incorrect decisions are made*
### Practical Exercise 1.3.3:

**Harvest Honey**

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prepare harvesting equipment e.g. by cleaning air tight buckets and protective wear</td>
<td></td>
</tr>
<tr>
<td>2. Light bee smoker</td>
<td></td>
</tr>
<tr>
<td>3. Put on protective wear</td>
<td></td>
</tr>
<tr>
<td>4. Approach the bee hive from behind (opposite to the entrance) or from the sides</td>
<td></td>
</tr>
<tr>
<td>5. Calm the bees gently by smoking</td>
<td></td>
</tr>
<tr>
<td>6. Open the bee hive</td>
<td></td>
</tr>
<tr>
<td>7. Harvest mature/ripe honey by plucking the combs and brushing off the bees from the combs (separate sealed and unsealed combs, light and dark combs by putting them in different airtight buckets)</td>
<td></td>
</tr>
<tr>
<td>8. Close the bee hive and gently smoke the bees to calm them</td>
<td></td>
</tr>
<tr>
<td>9. Extinguish the fire in the bee smoker</td>
<td></td>
</tr>
<tr>
<td>10. Take the honey in airtight buckets, label and store in a cool dry place/room</td>
<td></td>
</tr>
</tbody>
</table>

**Performance standards**:  
- Quality honey harvested  
- Retention of honey bee colony

**Related knowledge**:  
- Explain the properties of honey  
- Describe the procedure of determining honey maturity  
- Explain the importance of determining honey maturity  
- Describe the factors that affect the quality of honey  
- Explain the methods employed in checking water content in honey  
- Explain the bee defensive behavior  
- List the equipment for honey harvesting  
- Discuss honey quality control practices

**Required tools, equipment and materials**:  
- Air tight buckets, bee smoker, smoking materials, match box, bee brush, protective wear, hive tool, knife, and torch/lamp, labels

**Safety concerns**:  
- Wear protective gear  
- Be calm and gentle when handling bees  
- Always have a lit bee smoker for calming bees

**Errors**:  
- Poor quality honey harvested  
- Abscondment  
- Deaths of many bees  
- Bee hives may be burnt and the environment damaged

*observable and measurable criteria, **what may result if incorrect decisions are made*
MODULE 1.4:
Perform basic entrepreneurship tasks

Module purpose: At the end of this module, the trainee will be able to perform basic salesmanship and customer care tasks as well as generate basic financial records.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
1.4.1: Perform basic salesmanship tasks
1.4.2: Generate basic financial records
1.4.3: Provide basic customer care
Practical Exercise 1.4.1:
Perform basic salesmanship tasks

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Advertise bee products</td>
<td>2. Conduct basic market research</td>
</tr>
<tr>
<td>3. Display bee products</td>
<td>4. Apply basic communication skills</td>
</tr>
<tr>
<td>5. Negotiate prices for products</td>
<td>6. Cost bee products</td>
</tr>
</tbody>
</table>

Performance standards*:
• High sales of bee products

Related knowledge:
• Describe how to start a beekeeping business
• Describe how to manage a beekeeping business
• State factors that influence success of a beekeeping business
• Define a customer
• Define a business enterprise
• Illustrate an organization structure of a business enterprise
• Discuss the roles of different stakeholders in a business
• Explain characteristics of an entrepreneur
• Discuss types of bee products
• State the methods of market research
• Discuss the importance of customer care
• List the methods of advertisement
• Describe how to measure customer satisfaction
• Discuss negotiating skills
• Describe the procedure of costing bee products
• List the methods of handling customer complaints
• State the importance of tax payment

Required tools, equipment and materials:
• Paper/notebooks, pens, telephone

Safety concerns:
• Observe safety and environmental precautions

Errors**:
• Low sales
• Losses in business
• No or few customers attracted to business

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 1.4.2:
Generate basic financial records

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Develop a simple budget</td>
<td>2. Develop a simple income statement</td>
</tr>
<tr>
<td>3. Develop a simple expenditure statement</td>
<td>4. Develop income-expenditure records</td>
</tr>
</tbody>
</table>

Performance standards*:
Well-developed and maintained financial records
### Related knowledge:
- State factors that influence success of a beekeeping business
- Define an income statement
- Define expenditure statement
- Describe the procedure of developing an income statement
- Describe the procedure of developing an expenditure statement
- Define a successful business enterprise
- State types of financial records used in beekeeping
- State the importance of financial records
- Describe the procedure of costing bee products

### Required tools, equipment and materials:
- Paper/notebooks, pens, telephone

### Safety concerns:
- Observe safety and environmental precautions

### Errors**:
- Financial losses in business
- Low/over costed bee products

*observable and measurable criteria, **what may result if incorrect decisions are made

---

### Practical Exercise 1.4.3:

**Provide basic customer care**

| Steps involved | 1. Promote good customer relations  
2. Receive and respond to customer complaints  
3. Provide information to customers  
4. Conduct business evaluation  
5. Offer after sales service |
|---|---|

| Performance standards* | Satisfied customers  
Growing business |
|---|---|

| Related knowledge: | Describe how to retain customers  
Describe how to manage a beekeeping business  
State success factors of a beekeeping business  
Define customer relations  
Define factors leading to a successful beekeeping enterprise  
Discuss the importance of customer care  
Describe how to measure customer satisfaction  
Discuss how to evaluate a beekeeping business  
List the methods of handling customer complaints |
|---|---|

<table>
<thead>
<tr>
<th>Required tools, equipment and materials:</th>
<th>Paper/notebooks, pens, telephone and trained personnel</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Safety concerns:</th>
<th>Observe safety and environmental precautions</th>
</tr>
</thead>
</table>

| Errors**: | Low sales  
Losses in business  
Low customer retention |
|---|---|

*observable and measurable criteria, **what may result if incorrect decisions are made*
Job title:

Beekeeper

Occupational Level 2

Description:
A beekeeper level 2 is a person who practices beekeeping using transitional bee hives such as Kenya top bar hives. S/he is able to apply basic apiary management practices to produce hive products such as honey, beeswax and propolis.

Modules
2.1: Populate bee hives
2.2: Feed honey bees
2.3: Harvest hive products
2.4: Manage bee pests and predators
2.5: Perform moderate entrepreneurship tasks
**MODULE 2.1:**

Populate bee hives

---

**Figure 36: Transferring bees**

**Module purpose:** At the end of this module, the trainee will be able to bait bee hives. S/he will also be able to identify, calm and catch bee swarms. In addition, s/he will be able to divide and unite bee colonies.

**Approximate training duration of this module:** 20 days (4 weeks)

*[It is understood that the average training duration is contact time (training under trainer’s guidance)]*

**Practical Exercises:**

2.1.1: Bait bee hives  
2.1.2: Catch bee swarms  
2.1.3: Divide bee colonies  
2.1.4: Unite bee colonies
Practical Exercise 2.1.1:

Bait bee hives

Steps involved

1. Clean the bee hives e.g. by burning inside or by brushing
2. Melt baiting materials e.g. bees wax and propolis
3. Smear baiting material on the top bars/fix wax foundation on top bars in the center
4. Place baited top bars back in the bee hive and close it

Performance standards*:

• Position of baiting material
• Uniformity and spread of baiting material

Related knowledge:

• List types of bee baits
• Describe bait application techniques
• Explain why bait bee hives
• Explain the different castes in a honey bee colony (see figure 37)
• State the roles played by the different castes in a honey bee colony
• Explain the life cycle of the different bee castes (see figure 38)
• Describe the ways bees communicate
• Describe what is used to attract bees
• Describe the steps of populating a hive
• Explain why it is important to keep the hive clean

Required tools, equipment and materials:

Baiting materials e.g. beeswax and propolis, fire/heat source, top bars, wax foundation sheet, knife, gloves and apron

Safety concerns:

• Put on apron, gumboots and gloves during baiting
• Extinguish fire after baiting

Errors**:

• Low colonization
• Pest infestation
• Fire accidents

*observable and measurable criteria, **what may result if incorrect decisions are made
Practical Exercise 2.1.2: Catch bee swarms

**Steps involved**

1. Locate bee swarms
2. Prepare an empty bee hive by cleaning and baiting
3. Put on protective gear
4. Calm the bee swarms e.g. by sprinkling cold water or sugar syrup on the bees
5. Collect the bee swarm e.g. by shaking the branch so that the bees fall in the box/skep container (see figure 39)
6. Close the container and turn it upside down after collecting bees
7. Allow the bees to settle in the box/skep for about 20 minutes before transferring to shade/dark place
8. Carry the bee swarm to the apiary at night
9. Open half of the bee hive
10. Pour the bees gently into the bee hive
11. Close the bee hive and ensure that it is well positioned/placed
12. Feed the bees with supplementary feeds e.g. honey or sugar syrup
13. Fix queen includer at the hive entrance
14. Remove the queen includer after 3 days
15. Record and monitor performance of the new colony

**Performance standards***:

- Bee swarm retained

**Related knowledge**:

- Explain bee ecology and behavior
- Discuss causes of bee swarming
- Explain why beekeepers have to catch bee swarms
- Describe how to catch a bee swarm
- List equipment used for catching bee swarms

**Required tools, equipment and materials**:

- Protective gear, bee swarm, container e.g. bucket/pot/skep, ladder, empty bee hive and includer, cold water or sugar syrup, record book and pen

**Safety concerns**:

- Put on protective wear
- Have bee smoker lit
- Climb cautiously

**Errors**:

- Bee abscondment
- Accidents e.g. bee stings or falling down from trees
- Death of bees

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 2.1.3:
Divide bee colonies

| Steps involved | 1. Identify a strong bee colony to divide  
|                | 2. Prepare an empty bee hive e.g. by cleaning and baiting  
|                | 3. Light the bee smoker  
|                | 4. Put on protective wear  
|                | 5. Remove some top bars from the empty bee hive  
|                | 6. Gently calm the bee by smoking  
|                | 7. Open the bee hive with a strong bee colony  
|                | 8. Identify two combs with sealed and unsealed brood  
|                | 9. Transfer the two open brood combs into the empty bee hive and ensure that some unsealed brood combs remain in the old hive  
|                | 10. Identify two combs with pollen and transfer them to either sides of the brood combs in the new hive  
|                | 11. Also identify two combs with honey and transfer them to either sides of the pollen combs  
|                | 12. Scoop about half of the worker bees from the old bee hive into the new bee hive  
|                | 13. Replace top bars in both bee hives to ensure that no space is left  
|                | 14. Close both bee hives  
|                | 15. Place the new bee hive on the position of the old bee hive. Then place the old bee hive at least 1 meter from its original position or place it on top of the new bee hive with the entrance facing the opposite direction  
|                | 16. Record and monitor performance of the two colonies |

| Performance standards* |  
|                       | • Sealed and unsealed brood Identified  
|                       | • Both bee colonies retained  |

| Related knowledge |  
|--------------------|• Describe bee reproductive biology  
|                    |• Explain honey bee behavior  
|                    |• Discuss interpretation of bee calendar  
|                    |• Describe when and how to divide and transfer colonies  
|                    |• Describe the procedure of dividing colonies  
|                    |• Describe the procedure of transferring colonies  
|                    |• Explain the factors considered in dividing colonies  
|                    |• Explain the recommended time/season for dividing colonies  
|                    |• Discuss the advantages of dividing colonies  
|                    |• Describe how you can determine the strength of the colony  |

| Required tools, equipment and materials |  
|----------------------------------------|• Strong bee colony, new empty bee hive, hive tool, protective wear, bee smoker and smoking material, match box/fire source, bee brush, torch, and a container e.g. a plastic cup, record book, pen |

| Safety concerns |  
|-----------------|• Put on protective wear  
|                 |• Have a burning bee smoker  
|                 |• Extinguish fire after dividing colonies  |

| Errors** |  
|----------|• Abscondment  
|          |• Death of queen and worker bees  
|          |• Fire accidents  
|          |• Bee stings  |

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 2.1.4:
Unite colonies

<table>
<thead>
<tr>
<th>Steps involved</th>
<th>1. Identify weak colonies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Light the bee smoker</td>
</tr>
<tr>
<td></td>
<td>3. Put on protective wear</td>
</tr>
<tr>
<td></td>
<td>4. Calm the bees by gently smoking</td>
</tr>
<tr>
<td></td>
<td>5. Open the two weak bee colonies in the two beehives to be united</td>
</tr>
<tr>
<td></td>
<td>6. Make critical observations e.g. note the stronger queen</td>
</tr>
<tr>
<td></td>
<td>7. Identify stronger queen and cage it</td>
</tr>
<tr>
<td></td>
<td>8. Remove weaker queen and kill it</td>
</tr>
<tr>
<td></td>
<td>9. Transfer all the brood, honey and pollen combs, and bees to one beehive after not more than 1 hour (the 2 colonies should be separated by a newspaper in the middle)</td>
</tr>
<tr>
<td></td>
<td>10. Reintroduce the selected queen (in the cage with sugar, dough/honey) into the beehive to ensure that she will be accepted within 1 hour</td>
</tr>
<tr>
<td></td>
<td>11. Close the beehive</td>
</tr>
<tr>
<td></td>
<td>12. Check for acceptance of the queen after three days</td>
</tr>
<tr>
<td></td>
<td>13. Record and monitor performance of the new colony</td>
</tr>
</tbody>
</table>

Performance standards*:
- Selected queen accepted

Related knowledge:
- Discuss bee biology and behavior
- Describe techniques for uniting weak colonies
- Discuss the advantages of uniting colonies
- Explain the factors considered in uniting colonies
- Explain why it is not advisable to obstruct flight paths of the bees

Required tools, equipment and materials:
- Queen cage, protective wear, two weak bee colonies, hive tools, bee smoker and smoking materials, fire, sugar dough/sugar syrup/honey

Safety concerns:
- Put on protective gear
- Ensure that you have a burning bee smoker

Errors**:
- Bee colony death
- Abscondment

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 2.2:

Feed honey bees

Module purpose: By the end of this module, the trainee will be able to feed bees by establishing bee forage and providing water in the apiary. S/he will also be able to clean utensils for feeding bees and appreciate the need to protect natural forage sources for the bees.

Approximate training duration of this module: 10 days (2 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.2.1: Establish bee forage
2.2.2: Provide water
2.2.3: Clean utensils for feeding bees
2.2.4: Identify natural bee forage plants
2.2.5: Protect natural bee forage plants
Practical Exercise 2.2.1:

Establish bee forage

Steps involved
1. Identify bee forage plants that can grow in your farm e.g. Calliandra, Moringa, bottle brush
2. Acquire planting material e.g. by buying seeds/seedlings
3. Prepare garden/farm e.g. by digging
4. Plant the bee forage
5. Manage bee forage plants e.g. by weeding and pruning

Performance standards*:
- Bee forage plant species that are suitable for the climate selected and planted

Related knowledge:
- Discuss bee botany, bee forage plants
- Define agronomy and explain agronomic practices
- Explain crop-pest control and plant pathology

Required tools, equipment and materials:
- Bee forage planting materials e.g. seeds or seedlings, hoes, machete/panga/slasher, watering can, secateurs, rake, gumboots, gloves, apron

Safety concerns:
- Put on gumboots and gloves during field operations

Errors**:
- Low bee hive productivity
- Abscondment
- Poor quality honey

*observable and measurable criteria, **what may result if incorrect decisions are made
Practical Exercise 2.2.2: Provide water

Steps involved

1. Place a water trough e.g. cut jerry cans, plates, pots, calabash in the middle of the apiary
2. Pour clean water into the water trough
3. Place pieces of stones or sticks in the water trough so that bees will not drown
4. Wash bee watering utensils after each watering period

Performance standards*

• The sticks should float/stones must protrude above the water level

Related knowledge:

• Explain the importance of water to bees
• Explain seasonality of water availability
• Discuss hygiene and sanitation on watering troughs
• Explain the effects of water scarcity on bee colonies
• Discuss why sticks/stones should be placed in the water troughs

Required tools, equipment and materials:

• Water troughs, water, stones/pieces of sticks, jerry can/watering can

Safety concerns:

• Stones/sticks must be placed in the watering trough to prevent bees from drowning

Errors**:

• Bees may drown
• Water contamination and disease spread

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 2.2.3: Clean utensils for feeding bees

Steps involved

1. Collect water, detergent and brush
2. Wash the utensils with water and a mild detergent
3. Dry the utensils
## Performance standards*
- Utensils for feeding bees are clean

## Related knowledge:
- Explain why hygiene is important in feeding bees
- Discuss bee pests and diseases that may be a challenge if hygiene is not considered in beekeeping.
- Explain the importance of replacing bee feeds
- Explain the importance of cleaning bee feeding utensils at regular intervals

## Required tools, equipment and materials:
- Water, mild detergent, brush, bee feeding utensils, wiper, gloves

## Safety concerns:
- Proper disposal of feed residue
- Put on gloves while cleaning
- Keep detergent in proper storage away from children

## Errors**:
- Spread of bee diseases
- Death of colonies
- Accidents from drinking of the detergent/the wash by children

---

*observable and measurable criteria, **what may result if incorrect decisions are made

---

## Practical Exercise 2.2.4:

### Identify natural bee forage plants

#### Steps involved
1. Make observations on the natural flowering plants visited by bees in the surrounding area
2. Identify the different natural bee forage plants in the area
3. Take photographs/samples
4. Label and store photographs/samples in a safe pest free environment

#### Performance standards*
- Natural bee forage plants in the locality identified

#### Related knowledge:
- Explain bee botany
- Explain the bee and floral calendar
- Discuss the importance of plants to bees
- What is the importance of bees to plants

#### Required tools, equipment and materials:
- Panga/machete, pen, paper, camera/phone with camera, labels, photographs/samples of natural bee forage plants

#### Safety concerns:
- Wear protective clothing when working in the forest/bush
- Beware of snakes and biting insects
- Carry a panga/machete when working in the forest/bush

#### Errors**:
- Wrong apiary site selection
- Low bee hive productivity

*observable and measurable criteria, **what may result if incorrect decisions are made
### Practical Exercise 2.2.5:

**Protect natural bee forage plants**

| Steps involved | 1. Create a fire line  
|                | 2. Fence off the area  
|                | 3. Fix a label/sign post for the natural bee forage reserve  
|                | 4. Plant alternative sources of wood fuel  
|                | 5. Practice controlled grazing |

| Performance standards* | Natural bee forage plants protected |

| Related knowledge | Explain bee botany  
|                  | Discuss the indigenous bee forage plants in the area  
|                  | Explain the importance of indigenous plants in environmental conservation and beekeeping  
|                  | Explain the importance of natural bee forage plants in organic honey production  
|                  | Discuss the importance of natural plants in sustainable beekeeping |

| Required tools, equipment and materials | Machete/panga, slasher, hoe, seedlings/seeds, poles, barbed wire, nails, hammer, gloves, apron, and gumboots, labels/sign posts |

| Safety concerns | Wear protective clothing when working in the forest/bush  
|                | Beware of snakes and biting insects  
|                | Carry a panga/machete when working in the forest/bush |

| Errors** | Disappearance/extinction of indigenous bee forage trees  
|          | Environmental degradation  
|          | Bee colony loss  
|          | Low bee hive productivity  
|          | Rampant abscondments |

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 2.3:
Harvest hive products

Module purpose: At the end of this module, the trainee will be able to determine honey maturity and moisture content. S/he will be able to harvest honey, beeswax and propolis.

Approximate training duration of this module: 40 days (8 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.3.1: Determine honey maturity
2.3.2: Harvest honey
2.3.3: Determine moisture content of honey
2.3.4: Harvest propolis
Practical Exercise 2.3.1:
Determine honey maturity

<table>
<thead>
<tr>
<th>Steps involved</th>
<th>1. Light a bee smoker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Put on protective gear</td>
</tr>
<tr>
<td></td>
<td>3. Go to the apiary and make observations on bee flight activities,</td>
</tr>
<tr>
<td></td>
<td>smell of honey in bee hive, bees crowding at the hive entrance and</td>
</tr>
<tr>
<td></td>
<td>check the weight of the bee hive</td>
</tr>
<tr>
<td></td>
<td>4. Then calm the bees by smoking gently</td>
</tr>
<tr>
<td></td>
<td>5. Open the bee hive</td>
</tr>
<tr>
<td></td>
<td>6. Make observation on combs (sealed/unsealed combs) and record</td>
</tr>
<tr>
<td></td>
<td>7. Close the bee hive after putting back the top bars in their positions</td>
</tr>
<tr>
<td></td>
<td>8. Put off the fire in the smoker before leaving the apiary</td>
</tr>
<tr>
<td></td>
<td>9. The sealed/capped honey is mature for harvesting, you can now</td>
</tr>
<tr>
<td></td>
<td>plan to harvest if most of the honey combs are capped. Otherwise</td>
</tr>
<tr>
<td></td>
<td>do not harvest</td>
</tr>
</tbody>
</table>

Performance standards*:
- Mature honey harvested

Related knowledge:
- Describe indicators of ripe honey
- Explain the bee and floral calendar
- Explain the four key seasons of a colony cycle in a year (dearth, build-up, honey flow, harvesting)
- Explain how bees are managed during different seasons
- Describe the factors that influence flowering in plants
- Explain the signs of honey harvesting seasons
- Describe the plants and trees that bees visit for nectar collection
- Explain the causes of honey fermentation

Required tools, equipment and materials:
- Protective wear, bee smoker and smoking material, fire source, hive tools, torch, air tight buckets

Safety concerns:
- Put on protective wear
- Work during cool part of the day i.e. evening
- Always have a lit smoker during bee hive operations

Errors**: 
- Breakage of honey combs
- Abscondment
- Bee stings

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 2.3.2:
Harvest honey

Steps involved

1. Prepare harvesting equipment e.g. by cleaning buckets, hive tools and protective wear
2. Light bee smoker
3. Wear protective gear
4. Approach the bee hive from behind (opposite to the hive entrance) or from the sides
5. Calm the bees by smoking gently
6. Open the bee hive
7. Loosen and lift the combs in top bars/frames
8. Brush off the bees back into the bee hive
9. Cut sealed combs into the bucket and cover and put the top bars aside
10. Rearrange the top bars
11. Cover the bee hive
12. Smoke the bee hive gently to calm the bees
13. Brush off bees from your clothing and smoke if necessary
14. Extinguish the fire before living the apiary
15. Carry honey combs in the airtight buckets, label and store in a cool dry place

Performance standards*:
- Mature honey harvested
- Quality honey harvested
- Bee deaths minimized

Related knowledge:
- Explain the bee and floral calendar
- Discuss the indicators of mature honey
- Describe the characteristics of honey
- Describe procedures of harvesting honey
- Explain what causes bees to sting
- Explain how to avoid bee stings
- Describe how to manage bee stings
- Explain how to treat bee stings
- Describe honey quality management at harvesting
**The National Beekeeping Training and Extension Manual**

**Required tools, equipment and materials:**

- Protective wear, airtight buckets, bee smoker, smoking material, fire source, bee brush, knife and a torch/lamp.

**Safety concerns:**

- Wear protective gear
- Have a burning bee smoker
- Be calm and steady when handling bees
- Put off the fire in the bee smoker before leaving the apiary

**Errors**:

- Abscondment
- Poor quality honey
- Pests and robber bees attack
- Fire accidents

*Observable and measurable criteria, **what may result if incorrect decisions are made*

---

**Practical Exercise 2.3.3:**

**Determine the moisture content of honey**

**Steps involved**

1. Collect honey samples
2. Open the refractometer
3. Place a drop of honey on the refractometer slide and cover
4. Read the refractometer carefully facing the direction of light
5. Record the refractometer reading
6. Clean the slide thoroughly e.g. by wiping with a soft cloth
7. Cover the slide and store the refractometer in a dust free, dry room

**Performance standards***:

- Moisture content of honey noted and honey graded according to moisture content

**Related knowledge:**

- Discuss the process of honey formation
- Describe the characteristics of honey
- Explain the effects of high water content in honey
- Explain the best moisture range in honey

**Required tools, equipment and materials:**

- Refractometer, honey, scooping tool e.g. spoon, wiper e.g. tissue paper, gloves

**Safety concerns:**

- Ensure that honey is not contaminated.
- Carry out the activity away from the apiary to avoid robber bees

**Errors**:

- Poor grading of honey

*Observable and measurable criteria, **what may result if incorrect decisions are made*
Practical Exercise 2.3.4: 
Harvest propolis

<table>
<thead>
<tr>
<th>Steps involved</th>
<th>Performance standards*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Light bee smoker</td>
<td>• Clean propolis harvested</td>
</tr>
<tr>
<td>2. Put on protective wear</td>
<td></td>
</tr>
<tr>
<td>3. Calm the bees by smoking gently</td>
<td></td>
</tr>
<tr>
<td>4. Scrap propolis from the bee hive body into a collection container</td>
<td></td>
</tr>
<tr>
<td>5. Open the top cover</td>
<td></td>
</tr>
<tr>
<td>6. Scrap propolis from top bars and bee hive into the collection container</td>
<td></td>
</tr>
<tr>
<td>7. Cover the bee hive</td>
<td></td>
</tr>
<tr>
<td>8. Smoke the bees gently off your body and put off the bee smoker</td>
<td></td>
</tr>
<tr>
<td>9. Take the collected propolis, labels and store in a cool dry place</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related knowledge:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Explain how bees collect propolis from plants</td>
<td></td>
</tr>
<tr>
<td>• State uses of propolis to bees and humans</td>
<td></td>
</tr>
<tr>
<td>• Discuss plant sources of propolis</td>
<td></td>
</tr>
<tr>
<td>• Explain properties of propolis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required tools, equipment and materials:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Smoker and smoking materials, fire source, protective wear, hive tools and knife, containers e.g. bucket/plate, labels</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety concerns:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Put on protective wear</td>
<td></td>
</tr>
<tr>
<td>• Have a burning bee smoker</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Errors**:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Abscondment of bees</td>
<td></td>
</tr>
<tr>
<td>• Bee hives may be damaged</td>
<td></td>
</tr>
<tr>
<td>• Accidents from bee stings</td>
<td></td>
</tr>
</tbody>
</table>

*observable and measurable criteria,  **what may result if incorrect decisions are made

OR
Use a plastic propolis trap
1. Put the propolis trap under the top cover of a bee hive
2. Leave it for about 2 weeks
3. Remove the propolis trap and cool it e.g. by putting in a fridge
4. Shake the propolis trap to get the propolis into a collection container
5. Pack, label and store the collected propolis in a cool dry place

Figure 46: Harvesting propolis from a top bar hive

OR
Use a plastic propolis trap
1. Put the propolis trap under the top cover of a bee hive
2. Leave it for about 2 weeks
3. Remove the propolis trap and cool it e.g. by putting in a fridge
4. Shake the propolis trap to get the propolis into a collection container
5. Pack, label and store the collected propolis in a cool dry place

Figure 46: Harvesting propolis from a top bar hive
MODULE 2.4:
Manage bee pests and predators

Module purpose: At the end of this module, the trainee will be able to identify and control bee pests and predators.

Approximate training duration of this module: 15 days (3 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.4.1: Identify bee pests and predators
2.4.2: Control bee pests and predators
### Practical Exercise 2.4.1:

**Identify bee pests and predators**

![Photographing and identifying bee predators](image.jpg)

<table>
<thead>
<tr>
<th>Steps involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collect sample or take photographs of bee pests and predators</td>
</tr>
<tr>
<td>2. Observe and identify the pests and predators (e.g. varroa mites, wax moths, hive beetles, birds, ants, lizards, snakes, bee louse, rodents, honey badgers)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance standards*</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Photographs or samples of pests and predators identified</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related knowledge:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Discuss bee pests and predators and their ecology</td>
</tr>
<tr>
<td>• List the types of bee pests and predators</td>
</tr>
<tr>
<td>• Discuss the effects of bee pests and predators on beekeeping</td>
</tr>
<tr>
<td>• Discuss various bee pest and predator management options</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required tools, equipment and materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Samples of bee pests and predators or their pictures, magnifying glass, protective wear</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety concerns:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Avoid disposing live pests and predators within the apiary</td>
</tr>
<tr>
<td>• Put on gloves and face mask to avoid pest and predator spread</td>
</tr>
<tr>
<td>• Put on bee protective gear during sample collection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Errors**:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Spread of bee pests and predators</td>
</tr>
<tr>
<td>• Abscondment of bees</td>
</tr>
<tr>
<td>• Accidents from bee stings</td>
</tr>
</tbody>
</table>

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 2.4.2:
Control bee pests and predators

<table>
<thead>
<tr>
<th>Steps involved</th>
<th>Performance standards*</th>
<th>Related knowledge:</th>
<th>Required tools, equipment and materials:</th>
<th>Safety concerns:</th>
<th>Errors**:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Light a bee smoker</td>
<td>• Healthy and productive bees</td>
<td>• Discuss the various bee pests and predators, their symptoms, ecology and control options</td>
<td>• Protective gear, bee smoker, smoking materials, fire, hive tool, magnifying glass, grease, rat guard, hive disinfectants</td>
<td>• Put on protective wear</td>
<td>• Spread of bee pests and predators</td>
</tr>
<tr>
<td>2. Put on protective wear</td>
<td></td>
<td>• Explain bee biology and behavior</td>
<td></td>
<td>• Use appropriate disinfectant</td>
<td>• Low bee hive productivity</td>
</tr>
<tr>
<td>3. Calm the bees by smoking gently</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Abscondment of bees</td>
</tr>
<tr>
<td>4. Open the bee hive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Check for bee pest and predator infestation or presence within the apiary e.g. by observing bee activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Administer the appropriate control (grease, rat guard, bio pesticide)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Close the hive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Put off the bee smoker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*observable and measurable criteria,  **what may result if incorrect decisions are made
MODULE 2.5:
Perform moderate entrepreneurship tasks

Figure 49: Explaining the parts of a KTB hive to customers

**Module purpose:** At the end of this module, the trainee will be able to perform moderate salesmanship and customer care tasks as well as marketing of bee products.

**Approximate training duration of this module:** 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

**Practical Exercises:**
2.5.1: Perform moderate salesmanship tasks
2.5.2: Perform marketing tasks
2.5.3: Provide customer care
Practical Exercise 2.5.1:
Perform moderate salesmanship tasks

Steps involved
1. Develop a business plan
2. Develop sales proposals
3. Apply communication skills
4. Maintain sales records
5. Update financial records
6. Update administrative records (colony and operational records)
7. Supervise subordinates
8. Prepare work schedules

Performance standards*:
• High sales of bee products
• Successful beekeeping business

Related knowledge:
• Discuss business laws
• Describe principles of budgeting
• Discuss constituents of financial statements
• Explain key considerations for starting up a beekeeping business
• Discuss challenges in running a beekeeping business
• Explain purpose of developing a business plan
• List components of a business plan
• Discuss sources of funding
• List components of a sales proposal
• Discuss hiring and managing people
• Describe procedures of updating financial records
• Discuss types and channels of communication
• List types of financial and administrative records used in beekeeping
• Describe the key components of colony records
• Describe the key components of operational records

Required tools, equipment and materials:
• Paper/notebooks, pens, computer and printer, trained personnel

Safety concerns:
• Observe safety and environmental precautions

Errors**:
• Low sales
• Losses in business
• No or few customers attracted to business

*observable and measurable criteria,  **what may result if incorrect decisions are made

Practical Exercise 2.5.2:
Perform marketing tasks

Steps involved
1. Advertise bee products
2. Conduct market research
3. Develop a market proposal

Performance standards*:
• Increased sales
### Related knowledge:
- Discuss challenges in running a beekeeping business
- Explain the importance of conducting a market plan
- List components of a market plan
- List components of a sales proposal
- Describe procedures of conducting a market research
- Discuss the types and channels of communication

### Required tools, equipment and materials:
- Paper/notebooks, pens, telephone, computer and printer, trained personnel

### Safety concerns:
- Observe safety and environmental precautions

### Errors**:
- Financial losses in business
- Low sales of bee products

*observable and measurable criteria, **what may result if incorrect decisions are made

---

### Practical Exercise 2.5.3:
**Provide customer care**

| Steps involved | 1. Advise clients  
|               | 2. Promote client relations  
|               | 3. Provide after sales services  
|               | 4. Conduct service evaluation  
|               | 5. Exercise information and communication techniques |

| Performance standards* | 1. Satisfied customers  
|                       | 2. Growing business |

| Related knowledge: | 1. Describe how to retain customers  
|                   | 2. Describe how to manage a beekeeping business  
|                   | 3. State factors that influence success of a beekeeping business  
|                   | 4. Define customer relations  
|                   | 5. Explain factors leading to a successful beekeeping enterprise  
|                   | 6. Discuss the importance of customer care  
|                   | 7. Describe how to measure customer satisfaction  
|                   | 8. Discuss how to evaluate a beekeeping business  
|                   | 9. List the methods of handling customer complaints |

| Required tools, equipment and materials: | Paper/notebooks, pens, computer and printer, telephone, trained personnel |

| Safety concerns: | Observe safety and environmental precautions |

| Errors**: | 1. Low sales  
|          | 2. Losses in business  
|          | 3. Low customer retention |

*observable and measurable criteria, **what may result if incorrect decisions are made
Job title: Beekeeper

Occupational Level 3

Description:
A beekeeper level 3 is a person who practices beekeeping using frame bee hives such as Langstroth bee hives. S/he is able to apply modern apiary management practices such as queen rearing and bee feed preparation and provision to the bees. S/he harvests a variety of bee hive products and performs advanced entrepreneurial tasks.

Modules
3.1: Manage honey bees in frame bee hives  
3.2: Harvest, store and handle bee hive products  
3.3: Manage honey bee diseases  
3.4: Prepare honey bee feeds  
3.5: Rear honey bee queens  
3.6: Perform advanced entrepreneurship tasks
MODULE 3.1:

Manage honey bees in frame bee hives

Module purpose: At the end of this module, the participants will be able to successfully manage and harvest bee hive products such as honey from frame bee hives.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.1.1: Bait frame bee hives
3.1.2: Site frame bee hives
3.1.3: Inspect frame bee hives
3.1.4: Harvest honey from frame bee hives
3.1.5: Extract honey from frames
3.1.6: Replace weak/less productive queens
Practical Exercise 3.1.1:
Bait frame bee hives

**Steps involved**
1. Clean bee hive frames e.g. by brushing or smoking
2. Smoke inside the bee hive/box
3. Measure the size of bee hive frames
4. Cut the foundation beeswax sheets to fit the frames
5. Fix the foundation beeswax sheet on the frames (e.g. by melting the beeswax foundation to attach on the groove/ wires)

**Performance standards***:
- Beeswax foundation sheets well-attached to frames

**Related knowledge**:
- Explain how honey bees produce beeswax
- Explain factors that affect beeswax production
- Describe the characteristics of beeswax
- Discuss why bee hives should be baited
- List baiting materials
- Explain the use of pheromones and smell by honey bees

**Required tools, equipment and materials**:
- Beeswax foundation sheet, source of heat, frame bee hives, protective wear, brush, honey bee smoker, smoking materials

**Safety concerns**:
- Avoid over heating beeswax
- Put on protective wear such as gloves and apron

**Errors**
- Fire/heat accidents
- Wrong honey comb alignment
- Bees fail to colonize bee hives

*Observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 3.1.2:
Site frame bee hives

**Steps involved**
1. Prepare the site e.g. by clearing unwanted vegetation
2. Remove the super and keep it in a rodent free room
3. Make the bee hive stand (i.e. the height should be “back-saving” by making it to waist level)
4. Place the bee hive (brood chamber) on hive stand and cover (hive entrance should face direction away from wind flow and in the east (sun rise direction) if possible

**Performance standards***:
- Hives well sited

**Related knowledge**:
- Explain honey bee biology and behavior
- Explain changes in bee hive weight across seasons
- List types of stands available
- Discuss honey bee pests in the area and how siting can reduce the impact of these pests
Required tools, equipment and materials:

- Hive stands, frame bee hives, hoes, pangas/machetes, slashers, rakes, pickaxe, nails, hammer, protective wear

Safety concerns:

- Put on protective wear
- Use strong hive stands
- Carry a machete while moving to the site

Errors**:

- Accidents (e.g. snake bites)
- Failure of honey bees to colonize bee hives
- Bee hive stands may collapse
- Damage to bee hives

*observable and measurable criteria,  **what may result if incorrect decisions are made

Practical Exercise 3.1.3:

Inspect frame bee hives

Steps involved

1. Light bee smoker
2. Wear protective gear
3. Calm down the bees by gently smoking
4. Open the bee hive
5. Loosen frames using a hive tool and lift them up one at a time
6. Make observations on the honey bee combs and the honey bees on them (ensure to put back the frames in their original positions after observation)
7. Record observations
8. Close the bee hive
9. Put off the fire in the bee smoker before leaving the apiary
10. Plan to take actions on the observations made

Performance standards*:

- Honey bee colony performance records available

Related knowledge:

- Explain the importance of keeping records
- Explain the importance of bee hive inspection
- Describe honey bee lifecycle and changes within the bee hive
- Discuss the frequency of bee hive inspections
- Explain the honey bee castes and their anatomy

Required tools, equipment and materials:

- Protective wear, honey bee smoker, smoking materials, fire source, hive tools, pens and record book

Safety concerns:

- Put on bee protective gear
- Extinguish fire completely after use

Errors**:

- Accidents (e.g. bee stings)
- Comb breakages
- Death of many bees
- Fire outbreaks leading to bee hive and apiary damage
- Abscondment

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 3.1.4:

Harvest honey from frame bee hives

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prepare honey harvesting equipment</td>
<td></td>
</tr>
<tr>
<td>2. Light a bee smoker</td>
<td></td>
</tr>
<tr>
<td>3. Wear protective gear</td>
<td></td>
</tr>
<tr>
<td>4. Calm down the bees by gently smoking</td>
<td></td>
</tr>
<tr>
<td>5. Open the bee hive</td>
<td></td>
</tr>
<tr>
<td>6. Loosen the frames and lift them up one at a time</td>
<td></td>
</tr>
<tr>
<td>7. Brush off bees from the frame</td>
<td></td>
</tr>
<tr>
<td>8. Select mature honey in frames and place the selected frames in another box/empty hive</td>
<td></td>
</tr>
<tr>
<td>9. Replace all the frames which contain honey</td>
<td></td>
</tr>
<tr>
<td>10. Close the bee hive</td>
<td></td>
</tr>
<tr>
<td>11. Extinguish the bee smoker</td>
<td></td>
</tr>
<tr>
<td>12. Carry the mature honey for labelling and storage in a cool dry room and later extraction</td>
<td></td>
</tr>
</tbody>
</table>

Performance standards*:

- Quality honey harvested

Related knowledge:

- Explain the design of frame bee hives
- Describe honey bee products
- Describe honey bee behavior
- Describe signs of honey maturity
- Explain operation of a honey centrifuge extractor

Required tools, equipment and materials:

- Protective wear, smoker, smoking materials, fire source, hive tools, empty hive/box, bee brush, labels

Safety concerns:

- Put on protective wear
- Extinguish fire after use

Errors**:

- Bee stings
- Death of many bees
- Fire accidents
- Damage to frames/combs

*observable and measurable criteria,  **what may result if incorrect decisions are made
**Practical Exercise 3.1.5:**

**Extract honey from frame bee hives**

![Figure 51: Honey Centrifuge](image)

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clean honey processing equipment</td>
<td></td>
</tr>
<tr>
<td>2. Wear protective gear</td>
<td></td>
</tr>
<tr>
<td>3. Uncap honey combs in frames using a uncapping knife or comb</td>
<td></td>
</tr>
<tr>
<td>4. Place uncapped combs/frames into the honey centrifuge slots</td>
<td></td>
</tr>
<tr>
<td>5. Close the centrifuge</td>
<td></td>
</tr>
<tr>
<td>6. Rotate combs in the centrifuge</td>
<td></td>
</tr>
<tr>
<td>7. Turn the combs (follow steps 5 and 6)</td>
<td></td>
</tr>
<tr>
<td>8. Remove frames/combs which are empty</td>
<td></td>
</tr>
<tr>
<td>9. Place the combs in the box</td>
<td></td>
</tr>
<tr>
<td>10. Close the honey centrifuge and allow the honey to settle</td>
<td></td>
</tr>
<tr>
<td>11. Skim off the impurities such as beeswax</td>
<td></td>
</tr>
<tr>
<td>12. Label and store skimmed honey in a cool dry room</td>
<td></td>
</tr>
<tr>
<td>13. Return the frame combs to the hive in the apiary/hives</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance standards*:</th>
<th>• Quality honey extracted using a honey centrifuge</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Related knowledge:</th>
<th>• Describe the operations of a honey centrifuge machine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Discuss the characteristics and properties of beeswax and honey</td>
</tr>
<tr>
<td></td>
<td>• Explain honey quality standards</td>
</tr>
<tr>
<td></td>
<td>• Describe how to determine honey maturity</td>
</tr>
<tr>
<td></td>
<td>• Discuss the advantages of using a centrifuge compared to a honey press</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required tools, equipment and materials:</th>
<th>• Uncapping fork/knife, centrifuge extractor, frame combs containing honey, storage tanks, cup for scoping impurities, protective wear and gloves, labels</th>
</tr>
</thead>
</table>

| Safety concerns:                       | • Store honey in clean, dry food grade containers from paraffin, diesel and other oils |
|                                        | • Put on protective wear                                                          |
|                                        | • Observe food safety precautions e.g. ensure that all tools used are clean      |
|                                        | • Guard against pests e.g. ants                                                   |

| Errors**:                               | • Low honey quality                                                                |
|                                        | • Bees/robber bees disturbances                                                   |
|                                        | • Damage to honey bee combs                                                       |

*observable and measurable criteria, **what may result if incorrect decisions are made*
**Practical Exercise 3.1.6:**

**Replace weak queens**

| Steps involved | 1. Light a bee smoker  
|                | 2. Wear protective gear  
|                | 3. Calm down the bees by gently smoking  
|                | 4. Open the bee hive  
|                | 5. Locate, remove and cage the weak queen  
|                | 6. Introduce the new queen (e.g. by using a Millota or a cage with sugar dough within not more than 30 minutes from removing the weak queen)  
|                | 7. Close the bee hive and leave it for at least one week without opening  
|                | 8. Extinguish the fire before leaving the apiary  
|                | 9. Check for acceptance of the new queen e.g. by looking for eggs and brood  
|                | 10. Kill the weak given after the new one has been accepted  |

**Performance standards**:  
- Acceptance of the new queen

**Related knowledge**:  
- Describe honey bee biology and behavior  
- Explain the different honey bee castes and their roles  
- Discuss queen rearing techniques  
- Explain the reasons for having strong colonies  
- Explain the techniques used to get new queens in bee hives

**Required tools, equipment and materials**:  
- Queen cages, new/desired queen, protective wear, smoker, smoking materials, fire source, sugar dough, hive tool

**Safety concerns**:  
- Handle the queen carefully  
- Put on bee protective gear

**Errors**:  
- Ascondment may occur  
- Bee stings  
- Fire accidents  
- Death of the queen bee  
- Rejection of the new queen

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 3.2: Harvest and store bee hive products

Module purpose: At the end of this module, the trainee will be able to harvest and store bee hive products including bee venom, bee pollen and royal jelly.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.2.1: Harvest and store bee venom
3.2.2: Harvest and store bee pollen
3.2.3: Harvest and store royal jelly

Figure 52: Harvesting pollen
### Practical Exercise 3.2.1:

**Harvest and store bee venom**

| Steps involved | 1. Prepare bee venom collecting equipment e.g. by cleaning  
| 2. Put on protective gear  
| 3. Assemble venom collector e.g. by connecting the wires to power  
| 4. Place the venom collector at the entrance of the bee hive  
| 5. Switch on the collector and leave for about 30 minutes  
| 6. Scrap off venom into a collecting bottle using a sharp tool e.g. razor blade  
| 7. Seal the bottle containing the venom tightly and store in a refrigerator |

| Performance standards* | Bee venom conforming to quality standards collected and stored |

| Related knowledge: | Explain honey bee behavior  
| Explain honey bee anatomy and physiology  
| Explain the dangers and uses of bee venom  
| Discuss why bees sting  
| Discuss why bee venom collection should not last more than 40 minutes  
| List the factors that will affect quality of bee venom collected  
| Explain the effects of collecting bee venom from a bee hive placed near other colonized bee hives |

| Required tools, equipment and materials: | Venom collector, power source, protective gear, sharp tools e.g. razor blade, storage bottle, freezer, controller, labels |

| Safety concerns: | Ensure to wear protective gear  
| Store venom in a refrigerator and away from children |

| Errors** | Low quality of venom  
| Weak bees or even bee deaths caused by collecting the venom for long periods in the bee hive.  
| Accidents from venom toxicity |

*observable and measurable criteria, **what may result if incorrect decisions are made*
Practical Exercise 3.2.2:
Harvest and store bee pollen

Steps of performance:
1. Light a bee smoker
2. Put on protective gear
3. Calm the bees by gently smoking
4. Place a pollen trap at the bee hive entrance and collect pollen in the evenings into collection bags
5. Dry the pollen
6. Pack pollen in polythene bags, label and store at room temperature

Performance standards *:
• Quality pollen harvested and stored

Related knowledge:
• Discuss bee botany
• Explain the materials for making pollen traps and how the traps work
• Discuss why the pollen trap should not be used for long
• Explain bee forage for pollen production
• Discuss uses of pollen to bees and man
• Explain the bee and floral calendar

Required tools, equipment and materials:
• Pollen trap, protective gear, bee smoker, smoking materials, fire source, collection polythene bags, drier, labels

Safety concerns:
• Ensure to put on protective gear

Errors*:
• Low pollen quality
• No pollen collected

*observable and measurable criteria, **what may result if incorrect decisions are made
Practical Exercise 3.2.3:
Harvest and store royal jelly

**Steps involved**

1. Identify strong colonies
2. Prepare nuclei boxes
3. Light bee smoker
4. Put on protective gear
5. Prepare the nuclei boxes by transferring some bees and frames to these nucs
6. Make the honey bee colony queenless
7. Graft eggs using the grafting tool into queen cells on the frames
8. Introduce the queen cells with grafted eggs into the queen less colony
9. Monitor the performance and ensure that there is enough honey/food in the bee hive
10. On fourth day, extract royal jelly using a syringe/royal jelly harvesting pump and put in a bottle
11. Put off the fire in the smoker before leaving the apiary
12. Seal royal jelly in the bottle, label and store in a refrigerator

**Performance standards***:

- Quality royal jelly harvested

**Related knowledge**:

- Explain the life cycle of honey bees
- Describe the different honey bee castes/types
- Define royal jelly and explain its uses to bees and humans
- Explain the factors that affect royal jelly production
- Describe the procedures of harvesting royal jelly

**Required tools, equipment and materials**:

- Grafting tool, queen cells, strong colonies, queen cell holder frames, pump/syringe, bottles, fridge/freezer, bee smoker, smoking materials, fire source, protective gear, hive tool

**Safety concerns**:

- Put on protective gear to guard against bee stings
- Always have stand by lit bee smoker

**Errors*****

- Death of bee queens
- No royal jelly produced

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 3.3: Manage honey bee diseases

Module purpose: At the end of this module, the trainee/participants will be able to prevent, identify and control honey bee diseases.

Approximate training duration of this module: 10 days (2 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.3.1: Identify honey bee diseases
3.3.2: Control honey bee diseases
Practical Exercise 3.3.1:
Identify honey bee diseases

Steps involved
1. Light a bee smoker
2. Wear protective gear
3. Calm bees by gently smoking
4. Open hive
5. Check for honey bee disease signs e.g. dead bees, sluggish movements
6. Remove dead or diseased bees and combs and place samples in bags or take pictures for identification
7. Close bee hive
8. Put off bee smoker before leaving the apiary

Performance standards*:
• Common honey bee diseases identified

Related knowledge:
• Discuss the transmission of various honey bee diseases and their impacts on beekeeping
• Explain the symptoms of honey bee diseases
• Discuss honey bee pathology
• Explain control strategies for honey bee diseases
• Explain why beekeepers should report any strange disease to extension workers

Required tools, equipment and materials:
• Protective wear, bee smoker, fire source, hive tools, magnifying glass, sample collection bags, bee disease manual/guide, camera, labels, pictures of dead or diseased bees/brood/combs, labels

Safety concerns:
• Always have a burning bee smoker for calming the bees
• Put on bee protective gear
• Avoid disposing diseased samples anyhow in the apiary/environment

Errors**:
• Spread of honey bee diseases
• Abscondment
• Low bee hive productivity
• Colony loss

*observable and measurable criteria,  **what may result if incorrect decisions are made

Practical Exercise 3.3.2:
Control honey bee diseases

Steps involved
1. Light a bee smoker
2. Wear protective gear
3. Calm bees by gently smoking
4. Use appropriate honey bee disease control methods (e.g. bee drugs, bee hive disinfectants)
5. Close bee hive
6. Put off fire in the bee smoker before leaving the apiary

Performance standards*:
• Healthy and productive honey bees
### Related knowledge:
- Explain the various control measures of different honey bee diseases
- Explain honey bee biology and behavior

### Required tools, equipment and materials:
- Protective gear, bee smoker, hive tools, source of fire, bee drugs/hive disinfectants

### Safety concerns:
- Put on protective wear
- Use appropriate disinfectant

### Errors**:
- Spread of honey bee diseases
- Low bee hive productivity
- Abscondment
- Death of many bees

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 3.4:

Prepare bee feeds

Module purpose: At the end of this module, the participants will be able to prepare sugar syrup and honey feeds.

[Note: Preparation of soya feeds and bee pollen feeds are excluded at this level]

Approximate training duration of this module: 10 days (2 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.4.1: Prepare sugar syrup
3.4.2: Prepare honey feed

Figure 55: Preparing sugar syrup
### Practical Exercise 3.4.1:
**Prepare sugar syrup**

| Steps involved | 1. Measure cane sugar (1 kg)  
| 2. Measure clean water (1 litre)  
| 3. Mix cane sugar with water  
| 4. Stir the mixture thoroughly until the syrup is uniform  
| 5. Place the uniformly mixed syrup in a feeder box/container  
| 6. Light a bee smoker  
| 7. Put on protective wear  
| 8. Calm bees by gently smoking  
| 9. Open the bee hive  
| 10. Place the feed in the bee hive  
| 11. Close bee hive  
| 12. Put off the bee smoker  |

**Performance standards**:  
- Uniform mixture of sugar syrup produced  
- Sugar syrup not contaminated  
- Sugar syrup not spilt in the beehive or apiary

**Related knowledge**:  
- Describe the ratio of mixing water and sugar  
- Explain how to provide the mixture to honey bees  
- Explain when to provide sugar syrup to bees  
- Discuss hygiene and sanitation on feeding troughs or containers  
- Describe the quality of sugar and water to be used in making sugar syrup  
- Explain the procedure of preparing sugar syrup  
- Describe how to place the feed in the bee hive  
- Explain why you should avoid spilling food in the bee hive and at the apiary  
- Describe other honey bee feeds (e.g. honey feed, soya feed, bee pollen feed)

**Required tools, equipment and materials**:  
- Clean containers, cane sugar, water, weighing/measuring apparatus e.g. measuring cylinder and weighing scale, stirring rod, feeding box/container, protective gear, smoker, smoking materials, source of fire

**Safety concerns**:  
- Ensure that hygiene is properly maintained during syrup preparation  
- Ensure no feed over stays in the hive

**Errors**:  
- Bees may die  
- Bee disease outbreaks and spread  
- Pests may be attracted  
- Robber bees may attack the bee colony being fed

*observable and measurable criteria,  **what may result if incorrect decisions are made*
Practical Exercise 3.4.2: Prepare honey feed

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Get mature honey</td>
<td></td>
</tr>
<tr>
<td>2. Get feeder box or container</td>
<td></td>
</tr>
<tr>
<td>3. Pour the honey in the feeder box or container</td>
<td></td>
</tr>
<tr>
<td>4. Light a bee smoker</td>
<td></td>
</tr>
<tr>
<td>5. Put on protective wear</td>
<td></td>
</tr>
<tr>
<td>6. Calm bees by gently smoking</td>
<td></td>
</tr>
<tr>
<td>7. Open the bee hive</td>
<td></td>
</tr>
<tr>
<td>8. Place the feed in the bee hive</td>
<td></td>
</tr>
<tr>
<td>9. Close the bee hive</td>
<td></td>
</tr>
<tr>
<td>10. Put off the fire in the smoker before leaving the apiary</td>
<td></td>
</tr>
</tbody>
</table>

**Performance standards***:  
- Honey feed not contaminated  
- Honey feed not spilt in the bee hive or apiary

**Related knowledge**:  
- Explain application of honey as bee feed  
- Describe the composition of honey  
- Describe the procedure of making honey feed  
- Explain the importance of honey feed  
- Describe the physical characteristics of honey  
- Describe other types of honey bee feeds e.g. sugar syrup, soya feed, honey bee pollen feed

**Required tools, equipment and materials**:  
- Feeding container/box, honey, smoker, smoking material, fire source, protective wear, hive tool

**Safety concerns**:  
- Hygiene should be observed during honey feed preparation  
- Put on protective gear during apiary operations

**Errors**:  
- Robber bees may attack bee colony  
- Pests may be attracted  
- Bees may die from diseases due to poor hygiene
MODULE 3.5:
Rear honey bee queens

Module purpose: At the end of this module, the trainee will be able to produce quality queens and populate bee hives for improved productivity.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.5.1: Graft queens
3.5.2: Rear queens using the cup kit method
3.5.3: Rear queens using locally made queen cells
## Practical Exercise 3.5.1:
### Graft queens

<table>
<thead>
<tr>
<th>Steps involved</th>
<th>1. Identify a colony with desired traits e.g. productive and strong</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Prepare the nuclei boxes/breeding boxes</td>
</tr>
<tr>
<td></td>
<td>3. Prepare the queen cell holder frames</td>
</tr>
<tr>
<td></td>
<td>4. Wear protective gear</td>
</tr>
<tr>
<td></td>
<td>5. Light the bee smoker</td>
</tr>
<tr>
<td></td>
<td>6. Calm the bees by gently smoking</td>
</tr>
<tr>
<td></td>
<td>7. Open the bee hive</td>
</tr>
<tr>
<td></td>
<td>8. Identify sealed brood combs and place them in a breeding box</td>
</tr>
<tr>
<td></td>
<td>9. Identify pollen combs and honey</td>
</tr>
<tr>
<td></td>
<td>10. Place pollen combs and honey in the breeding box</td>
</tr>
<tr>
<td></td>
<td>11. Graft the eggs from the desired colony into the queen cells(e.g. those made manually using beeswax)</td>
</tr>
<tr>
<td></td>
<td>12. Place the eggs in the cells on the frame in the middle of the queen rearing box</td>
</tr>
<tr>
<td></td>
<td>13. Check after 2 days to confirm acceptance of eggs</td>
</tr>
<tr>
<td></td>
<td>14. Cage the queen cells after 12 days of grafting</td>
</tr>
<tr>
<td></td>
<td>15. Monitor the emergence of queens into cages until the 17th day</td>
</tr>
<tr>
<td></td>
<td>16. Collect the emerged queens in their cages and place them in prepared nuclei boxes</td>
</tr>
</tbody>
</table>

**Performance standards**: • Quality queens produced

**Related knowledge**: • Explain bee biology, anatomy and physiology  
• Explain honey bee behavior  
• Describe honey bee castes and their roles  
• Describe the techniques of queen rearing  
• Explain why breed/rear queens

**Required tools, equipment and materials**:  
• Nuclei boxes, grafting tools, protective gear, smoker, smoking materials, fire source, queen cages, hive tools, sugar syrup and feeder boxes, queen cells, queen cell holder frame

**Safety concerns**: • Put on protective wear  
• Handle queens carefully  
• Warn neighbours of the on-going work to minimize bee stings and complaints

**Errors**: • Failure to raise queens  
• Death of many bees  
• Abscondment  
• Bee stings

*observable and measurable criteria, **what may result if incorrect decisions are made*
Practical Exercise 3.5.2:
Rear queens using the cup kit method

| Steps involved | 1. Identify honey bee colony with desired traits e.g. a productive and strong honey bee colony  
2. Prepare nuclei boxes  
3. Prepare queen cell holder frames  
4. Naturalize/make the cup kit acceptable to the bees by placing it in the bee hive for 3 days  
5. Wear protective gear  
6. Light the bee smoker  
7. Calm down the bees by gently smoking  
8. Open the identified bee hive  
9. Identify and remove an empty comb in the middle  
10. Cut the identified comb in the middle and fix the cup kit  
11. Place the comb back in the middle of the bee hive  
12. Check the cup kit after 36 hours for eggs  
13. Remove the cups with eggs and fix in the queen cell holder frames in the nuclei boxes and monitor progress  
14. Cage the queen cells after 12 days  
15. Monitor and collect emerged queens in their cages and place them in prepared nuclei boxes |
|---|---|

Performance standards*:
- Quality queens produced

Related knowledge:
- Explain the honey bee biology, anatomy and physiology  
- Explain honey bee behavior  
- Describe honey bee castes and their roles  
- Describe the techniques of queen rearing  
- Explain why queens are reared  
- Discuss the floral and bee calendar  
- Explain the importance of food supply during queen rearing

Required tools, equipment and materials:
- Strong honey bee colonies, nuclei boxes, cup kits, protective gear, smoker, smoking materials, fire sources, queen cages, hive tools, sugar syrup, feeder boxes, queen cell holder frames

Safety concerns:
- Put on protective wear  
- Inform neighbours to avoid accidents  
- Handle the queen with care

Errors**:  
- Failure to raise queens  
- Bee stings  
- Abscondment  
- Death of many bees

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 3.5.3: Rear queens using locally made queen cells

### Steps involved

1. Identify a honey bee colony with desired traits e.g. a strong colony
2. Naturalize the queen rearing frame (make it acceptable to bees by placing it in the bee hive for about 3 days)
3. Make the queen cells using beeswax and fix on the queen rearing frame
4. Prepare the nuclei boxes
5. Wear protective gear
6. Light the bee smoker
7. Calm down the bees by gently smoking
8. Open the bee hive
9. Identify brood frames and place them in the queen rearing box (about 2 sealed brood combs)
10. Identify pollen and honey combs and fix them in the queen rearing box (place the pollen next to the brood and honey at the end)
11. Place the frame with locally made queen cells in the desired mother colony for the queen to lay eggs
12. Transfer the frame with the eggs (in queen cells made locally) into the queen rearing box (nuc)
13. Monitor acceptance of the eggs and cage accepted cells after 12 days
14. Collect emerged queens in their cages and place them in prepared nuclei boxes

### Performance standards*

- Quality queens produced

### Related knowledge:

- Explain honey bee biology, anatomy and physiology
- Explain honey bee behavior
- Describe honey bee castes and their roles
- Describe the techniques of queen rearing
- Explain why queens are reared
- Discuss the floral and bee calendar
- Explain the importance of having abundant food during queen rearing

### Required tools, equipment and materials:

- Strong honey bee colonies, nuclei boxes, protective gear, smoker, smoking materials, fire source, queen cages, hive tools, sugar syrup, feeds boxes, queen cell holder frame, beeswax, pen/sticks, pan

### Safety concerns:

- Put on protective wear
- Inform neighbours to avoid accidents and complaints due to bee stings
- Handle the queens with care

### Errors**:

- Failure to raise queens
- Bee stings
- Abscondment
- Death of many bees

*observable and measurable criteria,  **what may result if incorrect decisions are made
MODULE 3.6:
Perform advanced entrepreneurship tasks

Module purpose: At the end of this module, the trainee will be able to perform advanced salesmanship and customer care tasks as well as marketing of bee hive products.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.6.1: Perform advanced salesmanship tasks
3.6.2: Perform marketing tasks
3.6.3: Provide customer care
### Practical Exercise 3.6.1:

#### Perform advanced salesmanship tasks

| Steps involved | 1. Develop a business plan  
|                | 2. Develop sales proposals  
|                | 3. Apply communication skills  
|                | 4. Maintain sales records  
|                | 5. Update financial records  
|                | 6. Update administrative records (colony and operational records)  
|                | 7. Supervise subordinates  
|                | 8. Prepare work schedules  |

| Performance standards* | • High sales of bee hive products  
|                        | • Successful beekeeping business  |

| Related knowledge | • Discuss business laws  
|                   | • Describe principles of budgeting  
|                   | • Discuss constituents of financial statements  
|                   | • Explain key considerations for starting up a beekeeping business  
|                   | • Discuss challenges in running a beekeeping business  
|                   | • Explain the purpose of developing a business plan  
|                   | • List components of a business plan  
|                   | • Discuss the sources of funding  
|                   | • List the components of a sales proposal  
|                   | • Discuss hiring and managing people  
|                   | • Describe the procedure of updating financial records  
|                   | • Discuss types and channels of communication  
|                   | • List the types of financial and administrative records used in beekeeping  
|                   | • Describe the key components of colony records  
|                   | • Describe the key components of operational records  |

| Required tools, equipment and materials | • Paper, pens, computer and printer, trained personnel  |

| Safety concerns | • Observe safety and environmental precautions  |

| Errors** | • Low sales  
|          | • Losses in business  
|          | • No or few customers attracted to the business  |

*observable and measurable criteria,  **what may result if incorrect decisions are made
## Practical Exercise 3.6.2: Perform marketing tasks

### Steps involved
1. Advertise bee products
2. Conduct market research
3. Develop a market proposal

### Performance standards*
- Increased sales

### Related knowledge:
- Discuss challenges in running a beekeeping business
- Explain the importance of conducting a market plan
- List components of a market plan
- List components of a sales proposal
- Describe the procedure of conducting a market research
- Discuss types and channels of communication

### Required tools, equipment and materials:
- Paper, pens, telephone, computer and printer, trained personnel

### Safety concerns:
- Observe safety and environmental precautions

### Errors**
- Financial losses in business
- Low sales of bee products

---

*observable and measurable criteria, **what may result if incorrect decisions are made

---

## Practical Exercise 3.6.3: Provide customer care

### Steps involved
1. Advise clients
2. Promote client relations
3. Provide after sales services
4. Conduct service evaluation
5. Exercise information and communication techniques

### Performance standards*
- Satisfied customers
- Growing business

### Related knowledge:
- Describe how to retain customers
- Describe how to manage a beekeeping business
- State factors that influence success of a beekeeping business
- Define customer relations
- Explain factors leading to a successful beekeeping enterprise
- Discuss the importance of customer care
- Describe how to measure customer satisfaction
- Discuss how to evaluate a beekeeping business
- List the methods of handling customer complaints

### Required tools, equipment and materials:
- Paper, pens, computer and printer, telephone, trained personnel

### Safety concerns:
- Observe safety and environmental precautions
Errors**:

- Low sales
- Losses in business
- Low customer retention

*observable and measurable criteria, **what may result if incorrect decisions are made

### Overview of modules for bee hive product processor

<table>
<thead>
<tr>
<th>Code</th>
<th>Module Title</th>
<th>Average duration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Days</td>
</tr>
<tr>
<td></td>
<td><strong>Bee Hive Product Processor Level 1 modules</strong></td>
<td></td>
</tr>
<tr>
<td>UA/PP/1.1</td>
<td>Process bee honey</td>
<td>20</td>
</tr>
<tr>
<td>UA/PP/1.2</td>
<td>Process beeswax</td>
<td>20</td>
</tr>
<tr>
<td>UA/PP/1.3</td>
<td>Perform basic entrepreneurship Tasks</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>Bee Hive Product Processor Level 2 modules</strong></td>
<td></td>
</tr>
<tr>
<td>UA/PP/2.1</td>
<td>Process and package bee honey</td>
<td>35</td>
</tr>
<tr>
<td>UA/PP/2.2</td>
<td>Mould beeswax</td>
<td>20</td>
</tr>
<tr>
<td>UA/PP/2.3</td>
<td>Clean propolis</td>
<td>5</td>
</tr>
<tr>
<td>UA/PP/2.4</td>
<td>Perform moderate entrepreneurship task</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>Bee Hive Product Processor Level 3 modules</strong></td>
<td></td>
</tr>
<tr>
<td>UA/PP/3.1</td>
<td>Make honey-based products</td>
<td>20</td>
</tr>
<tr>
<td>UA/PP/3.2</td>
<td>Make beeswax products</td>
<td>10</td>
</tr>
<tr>
<td>UA/PP/3.3</td>
<td>Make propolis products</td>
<td>30</td>
</tr>
<tr>
<td>UA/PP/3.4</td>
<td>Perform advanced entrepreneurship task</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>Summary</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 training modules (Level 1)</td>
<td>3 months</td>
</tr>
<tr>
<td></td>
<td>4 training modules (Level 2)</td>
<td>4 months</td>
</tr>
<tr>
<td></td>
<td>4 training modules (Level 3)</td>
<td>4 months</td>
</tr>
</tbody>
</table>

Note: It is understood that the average training duration is contact time (under structured training). Total contact training duration per week is assumed to be 5 days.
Job title: Bee Hive Product Processor

Occupational Level 1

Description: A bee Bee Hive Product Processor level 1 is a person who processes honey and beeswax to semi processed products and markets them.

MODULES
1.1: Process honey
1.2: Process beeswax
1.3: Perform basic entrepreneurship tasks
MODULE 1.1: Process honey

Module purpose: At the end of this module, the trainee will be able to process honey by straining and pressing honey combs.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
1.1.1: Strain honey
1.1.2: Press honey combs

Figure 58: Pressing honey combs
Practical Exercise 1.1.1:

**Strain honey**

| Steps involved                                      | 1. Prepare equipment e.g. by cleaning and drying  
|                                                   | 2. Sort/separate dark and light/white honey combs  
|                                                   | 3. Remove all dead bees and any other unwanted materials e.g. grass  
|                                                   | 4. Uncap the honey combs and break them before filtering with straining cloth tied over a bucket  
|                                                   | 5. Settle the honey in settling tanks or buckets for at least 12 hours  
|                                                   | 6. Remove the scum e.g. by scooping with a cup  
|                                                   | 7. Test the moisture content of honey using a refractometer  
|                                                   | 8. Pack honey in food grade containers, label and store in a cool dry room  |

**Performance standards***:  
- Cover honey at all times  
- If warming is required, the temperature used should not go beyond 45°C  
- Use only food grade equipment in honey processing and storage  
- Maintain hygiene throughout the process  

**Related knowledge**:  
- Explain the properties of honey  
- Discuss the methods of processing honey  
- Define honey straining  
- Describe the process of honey straining  
- State the values of honey  
- Describe the factors that affect the quality of honey  
- Explain the methods used to check the water content in honey  

**Required tools, equipment and materials**:  
- Food grade straining buckets, cloth for honey straining, rubber band for tying straining cloth on bucket, tables, food grade gloves, apron, gumboots, cap and face mask, honey combs, labels  

**Safety concerns**:  
- Wear protective gear and work in a bee proof room  
- Ensure hygiene throughout the process  
- Avoid slippery surfaces  

**Errors****:  
- Financial losses  
- Loss of honey due to poor handling  
- Poor quality honey  
- Injuries  
- Damage to equipment  

*observable and measurable criteria, **what may result if incorrect decisions are made
Practical Exercise 1.1.2:
Press honey combs

<table>
<thead>
<tr>
<th>Steps involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prepare equipment e.g. by cleaning and drying</td>
</tr>
<tr>
<td>2. Sort honey combs (white and dark combs should be separated)</td>
</tr>
<tr>
<td>3. Remove all dead bees and other foreign materials from the honey combs</td>
</tr>
<tr>
<td>4. Uncap and break the honey combs, put them in cloth bags and place them in the honey press</td>
</tr>
<tr>
<td>5. Press the honey combs e.g. by rotating the handle of the press</td>
</tr>
<tr>
<td>6. Pour the honey in tanks and allow it to settle for at least 12 hours</td>
</tr>
<tr>
<td>7. Remove the scum e.g. by scooping with a cup</td>
</tr>
<tr>
<td>8. Test the moisture content of the honey</td>
</tr>
<tr>
<td>9. Pack it in food grade containers before labelling and storing in dry rooms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance standards*</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Honey kept covered in airtight containers</td>
</tr>
<tr>
<td>• Honey kept at room temperature</td>
</tr>
<tr>
<td>• Food grade equipment used in processing</td>
</tr>
<tr>
<td>• Hygiene is maintained throughout honey processing stages</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Explain the properties of honey</td>
</tr>
<tr>
<td>• Discuss the methods of processing honey</td>
</tr>
<tr>
<td>• State advantages and disadvantages of the honey press method</td>
</tr>
<tr>
<td>• Describe the honey press method of processing honey</td>
</tr>
<tr>
<td>• Describe techniques used in the honey press method</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required tools, equipment and materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A honey press machine, straining cloth, sieves and collection/settling tanks/buckets, tables where buckets are placed, air tight food grade buckets for packaging, honey refractometer, protective wear, water, clean towel, uncapping knife/comb, honey combs, labels</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Wear protective gear (overall, gloves, hair cap, mouth and nose cover, foot wear)</td>
</tr>
<tr>
<td>• Ensure hygiene throughout the process</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Errors**</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Loss of honey due to poor handling</td>
</tr>
<tr>
<td>• Financial losses</td>
</tr>
<tr>
<td>• Damage to equipment</td>
</tr>
<tr>
<td>• Poor quality honey</td>
</tr>
</tbody>
</table>

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 1.2: Process beeswax

**Module purpose:** At the end of this module, the trainee will be able to process beeswax.

**Approximate training duration of this module:** 20 days (4 weeks)

*It is understood that the average training duration is contact time (training under trainer’s guidance)*

**Practical Exercise:**
1.2.1: Process beeswax
## Practical Exercise 1.2.1:
### Process beeswax

| Steps involved | 1. Prepare the equipment e.g. organize the double boiler materials, where the wax is placed into an inner container and this container is placed into a big pot of water that is kept boiling to melt the wax.  
2. Heat water in the outside pot of the double boiler  
3. Break the solid combs or wax up into small pieces  
4. Place the pieces of combs/wax into the inner pot of the double boiler  
5. Keep the water boiling until the wax has entirely melted  
6. Prepare a suitable plastic mould by smearing the inside with soap to prevent the wax sticking to it  
7. Loosely tie the straining material over the top of the mould. (There should be a dip in the material so the wax does not spill over the edge and it is better if a helper can hold the material in place as the wax will solidify before it has all run through the cloth and the cloth can be usefully moved along to allow the last wax to run through it).  
8. Repeat steps 1-6 and pour the molten wax through some very fine straining material e.g. a clean cloth material  
9. Allow the wax to cool and solidify in the mould and removed it when solid  
10. Carefully clean the dirt left behind on the cloth so that it can be reused  
11. Clean all utensils quickly while the wax is liquid  
12. Clean, pack, label and store wax blocks/pieces |

| Performance standards* | • Pure beeswax block/piece produced  
• Use the double boiling method |

| Related knowledge: | • Explain how bees produce beeswax  
• Discuss the importance of bees wax to bees and humans  
• Explain the properties of beeswax  
• Describe how beeswax is processed  
• State the uses of beeswax |

| Required tools, equipment and materials: | • Saucepans, wooden stirring sticks, fuel e.g. charcoal, beeswax moulds, straining cloth, soap, protective wear and fire source, labels |

| Safety concerns: | • Do not burn beeswax directly but instead use the double boiling method  
• Avoid touching molten beeswax |

| Errors**: | • Dirty beeswax produced  
• Accidents caused by molten wax  
• Financial losses |

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 1.3:
Perform basic entrepreneurship tasks

Module purpose: At the end of this module, the trainee will be able to perform basic salesmanship and customer care tasks as well as generate basic financial records.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
1.3.1 Perform basic salesmanship tasks
1.3.2 Generate basic financial records
1.3.3 Provide basic customer care
Practical Exercise 1.3.1:
**Perform basic salesmanship tasks**

<table>
<thead>
<tr>
<th>Steps involved</th>
<th>Performance standards*</th>
<th>Related knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Advertise bee hive products e.g. displaying bee hive products</td>
<td>• Practice good customer care</td>
<td>• Describe how to start a bee hive products processing business</td>
</tr>
<tr>
<td>2. Conduct basic market research</td>
<td>• Good financial management practice</td>
<td>• Describe how to manage a bee hive products processing business</td>
</tr>
<tr>
<td>3. Apply basic communication skills</td>
<td>• State factors that influence the success of a bee hive products</td>
<td>• State factors that influence the success of a bee hive products processing business</td>
</tr>
<tr>
<td>4. Negotiate bee hive product pricing</td>
<td>• Define a customer</td>
<td>• Define a business enterprise</td>
</tr>
<tr>
<td>5. Cost bee hive products</td>
<td>• Cost bee hive products</td>
<td>• Illustrate an organization structure of a bee hive products processing business</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Discuss the roles of different stakeholders in a business</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Explain the characteristics of an entrepreneur</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Discuss the importance of customer care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Describe the procedure of costing bee hive products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• List the methods of handling customer complaints</td>
</tr>
</tbody>
</table>

**Required tools, equipment and materials:**
- Paper, pens, telephone, computer and printer

**Safety concerns:**
- Observe safety and environmental precautions

**Errors**
- Low sales
- Losses in business
- No or few customers attracted to business

*observable and measurable criteria, **what may result if incorrect decisions are made*

Practical Exercise 1.3.2:
**Generate basic financial records**

<table>
<thead>
<tr>
<th>Steps involved</th>
<th>Performance standards*</th>
<th>Related knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Develop a simple budget</td>
<td>• Keep financial business records at all times</td>
<td>• State factors that influence the success of a bee hive products processing business</td>
</tr>
<tr>
<td>2. Develop a simple expenditure statement</td>
<td></td>
<td>• Define an income statement</td>
</tr>
<tr>
<td>3. Develop income-expenditure records</td>
<td></td>
<td>• Define a successful business enterprise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Explain the types of financial records used in bee hive products processing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• State the importance of financial records</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Describe the procedure of costing processed bee hive products</td>
</tr>
</tbody>
</table>

**Required tools, equipment and materials:**
- Paper, pens, telephone, computer and printer

**Safety concerns:**
- Observe safety and environmental precautions

**Errors**
- Low sales
- Losses in business
- No or few customers attracted to business

*observable and measurable criteria, **what may result if incorrect decisions are made*
### Practical Exercise 1.3.3:
**Provide basic customer care**

| Steps involved | 1. Receive and respond to customer complaints  
2. Provide information to customers  
3. Conduct business evaluation  
4. Offer after sales services |
|-----------------|------------------------------------------------------------------------------------------------|

| Performance standards* |  
Keep customers satisfied  
Ensure business growth |
|------------------------|------------------------------------------------------------------|

| Related knowledge |  
Describe how to retain customers  
Define customer relations  
Discuss the importance of customer care  
Describe how to measure customer satisfaction  
List the methods of handling customer complaints |
|-------------------|------------------------------------------------------------------------------------------------|

| Required tools, equipment and materials |  
Paper, pens, computer, printer and telephone |
|------------------------------------------|------------------------------------------------------------------|

| Safety concerns |  
Observe safety and environmental precautions |
|-----------------|------------------------------------------------------------------------------------------------|

| Errors** |  
Low sales  
Losses in the business  
Low customer retention |
|-----------|------------------------------------------------------------------|

*observable and measurable criteria, **what may result if incorrect decisions are made
Job title: Bee Hive Product Processor

Occupational Level 2

Description:
A bee hive products processor level 2 is a person who processes bee hive products (honey, beeswax, propolis) to various forms using improved technology.

Modules
2.1: Process and pack honey
2.2: Mould bee wax
2.3: Process propolis
2.4: Perform moderate entrepreneurship tasks
MODULE 2.1:
Process and pack honey

Module purpose: At the end of this module, the trainee will be able to extract honey and process comb honey into liquid, cream and granulated honey. S/he will also be able to pack processed honey to meet recommended quality standards.

Approximate training duration of this module: 35 days (7 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.1.1: Extract honey
2.1.2: Process liquid honey
2.1.3: Process cream honey
2.1.4: Process granulated honey
Practical Exercise 2.1.1: Extract honey

**Steps involved**

1. Prepare equipment e.g. by cleaning and drying
2. Remove bees and other foreign materials from honey combs
3. Uncap honey combs using uncapping fork or knife
4. Place the honey comb frames in a centrifuge and run it
5. Filter and collect honey in tanks/buckets
6. Settle the honey in tanks/buckets for at least 12 hours
7. Measure the moisture content of honey using a refractometer
8. Pack the honey in food grade buckets/containers and store in a cool dry room

**Performance standards**: 

- Ensure that the honey is covered at all times
- Use only clean food grade equipment
- Maintain hygiene throughout the process

**Related knowledge**:  

- Explain the properties of honey
- Discuss the methods of processing honey
- Discuss the process of honey extraction
- Explain how the centrifugal honey extractor works
- Explain the advantages and disadvantages of using the centrifugal honey extractor State values of honey

**Required tools, equipment and materials**:  

- Centrifugal honey extractor, sieves and decamping trays, trays, settling tanks, tables, food grade air tight buckets for packing, protective wear, water, clean towel, cup, uncapping knife/fork

**Safety concerns**:  

- Wear food safety gear
- Ensure hygiene is maintained throughout the process
- Use food grade equipment only

**Errors**:  

- Poor quality honey
- Loss of honey due to poor handling
- Financial losses
- Body injuries
- Damage to equipment

---

Practical Exercise 2.1.2: Process liquid honey

**Steps involved**

1. Liquidify the honey in case it has granulated
2. Filter the honey
3. Settle the honey in tanks
4. Skim honey to remove impurities
5. Pack the honey in desired food grade packaging containers eg. bottles
6. Label the honey
7. Store the honey in cool dry room (room temperature)

**Performance standards**:  

- Honey must be covered at all times
- Avoid exposing honey to very high temperatures (more than 45 °C)
- Use food grade containers only
- Maintain hygiene throughout the process
- Use dry containers and materials

---

*observable and measurable criteria, **what may result if incorrect decisions are made*
**Related knowledge:**
- Explain the properties of honey
- Discuss the process of honey making by bees
- State uses of liquid honey
- State the different value added products from liquid honey
- Describe the methods of processing honey (straining, pressing, centrifugal)
- Discuss the qualities of good liquid honey
- Describe the factors that influence the quality of honey
- Explain the methods employed in checking water content of honey

**Required tools, equipment and materials:**
- Table, honey heater/double jacket heater with thermostat, settling tank, strainer, fine cloth meshes, food protective wear, food grade containers, labels, granulated honey

**Safety concerns:**
- Use food grade containers
- Workers must be medically examined
- Observe hygiene throughout the production process

**Errors**
- Poor quality honey due to over-heating
- Accidents
- Pests invade the place

*observable and measurable criteria, **what may result if incorrect decisions are made*

---

**Practical Exercise 2.1.3:**
**Process cream honey**

**Steps involved**
1. Liquidify the honey e.g. by using a honey warmer
2. Filter the honey
3. Settle the honey in settling tanks
4. Add granulated honey to the liquid honey
5. Stir the mixture of granulated and liquid honey many times
6. Settle the mixed honey
7. Skim the honey to remove impurities
8. Pack the cream honey into food grade containers
9. Label the cream honey in the containers
10. Store cream honey in a cool dry place

**Performance standards***:
- Honey must be covered at all times
- Avoid exposing honey to very high temperatures
- Use food grade containers
- Maintain hygiene throughout the process
- Use dry containers and materials

**Related knowledge**:
- Explain how bees make honey
- Discuss the importance of honey
- Describe properties of cream honey
- State uses of cream honey
- Discuss qualities of good cream honey
- Describe the methods of processing cream honey (straining, pressing, centrifuging)

**Required tools, equipment and materials**:
- Table, honey heater/double jacket heater with thermostat, settling tank, strainer, fine cloth meshes, stirring stick, protective wear, food grade containers, labels, granulated honey
**Safety concerns:**
- Use food grade containers
- Observe hygiene throughout the production process

**Errors**:  
- Loss of finances
- Poor quality honey produced
- Pests can invade the processing area

*observable and measurable criteria, **what may result if incorrect decisions are made

### Practical Exercise 2.1.4:  
**Process granulated honey**

| Steps involved | 1. Liquidify the honey e.g. by using a honey warmer  
|                | 2. Filter the honey  
|                | 3. Settle the honey in settling tanks  
|                | 4. Add granulated honey to the liquid honey  
|                | 5. Stir the mixture of granulated and liquid honey once  
|                | 6. Settle the mixed honey for 5 days for it to solidify  
|                | 7. Pack granulated honey into food grade containers  
|                | 8. Label the granulated honey in the containers  
|                | 9. Store granulated honey in a cool dry place |

**Performance standards**:  
- Honey must be covered at all times  
- Avoid exposing honey to very high temperatures  
- Use food grade containers  
- Maintain hygiene throughout the process

**Related knowledge**:  
- Discuss the process by which bees make honey  
- Explain the properties of honey  
- Define granulated honey  
- State uses of granulated honey  
- List the advantages and disadvantages of granulated honey  
- Discuss the qualities of good granulated honey  
- Describe the methods of processing honey (straining, pressing, centrifugal)

<table>
<thead>
<tr>
<th>Honey Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Honey</td>
<td>Some honey remains in liquid state naturally if they have low glucose to water ratio of less than 1:8.</td>
</tr>
<tr>
<td>Chunk honey</td>
<td>This is where 1 or 2 strips of cut comb are placed in a transparent wide mouthed container, which is then filled with light-coloured liquid honey.</td>
</tr>
<tr>
<td>Creamed honey</td>
<td>Homogeneously stable crystallized honey with a pleasant creamy appearance obtained by the addition of a small quantity of already crystallized honey to liquid honey.</td>
</tr>
<tr>
<td>Comb honey</td>
<td>Small section of completely sealed comb built of virgin (new/white) bees wax, preferably with light coloured honey.</td>
</tr>
<tr>
<td>Crude honey</td>
<td>Combination of honey, pollen, bee brood and other impurities like sticks, tree leaves ... etc</td>
</tr>
</tbody>
</table>
### Forms of honey and how they are made

<table>
<thead>
<tr>
<th>Semi-refined honey</th>
<th>Skimmed honey after removal of comb after several days of settling. It needs to be further sieved to remove impurities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granulated honey</td>
<td>Honey is a super saturated solution i.e. it contains more dissolved substance than the solvent can normally retain in solution at any specific temperature. Such a solution is unstable and will in time revert to the stable saturated condition by crystallizing the excess solute.</td>
</tr>
</tbody>
</table>

#### Required tools, equipment and materials:
- Table, honey heater/double jacket heater with thermostat, settling tank, strainer, fine cloth meshes, stirring stick, protective wear, food grade containers, labels

#### Safety concerns:
- Use food grade containers
- Observe hygiene throughout the production process

#### Errors*:
- Loss of finances
- Poor quality honey produced
- Pests can invade the processing area

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 2.2:

Mould beeswax

Module purpose: At the end of this module, the trainee will be able to mould beeswax, and produce different products like candles and beeswax pieces.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercise:
2.2.1: Produce beeswax candles
Practical Exercise 2.2.1:
Produce beeswax candles

<table>
<thead>
<tr>
<th>Steps involved</th>
<th>1. Melt good quantity beeswax in double boiler</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Prepare the mould by rubbing the inside with soap so that the wax does not stick to the mould</td>
</tr>
<tr>
<td></td>
<td>3. Position the wick carefully in the centre of the candle mould</td>
</tr>
<tr>
<td></td>
<td>4. The wick should be clipped at the top so that it rests on the top of the mould to keep it in place. A small piece of stick cut part way through is sufficient for this</td>
</tr>
<tr>
<td></td>
<td>5. Put the mould securely in place where it will not be disturbed before the wax is set. This will be several hours</td>
</tr>
<tr>
<td></td>
<td>6. It may be helpful to stand the mould in a tin of cold water. This will give it stability and also help it to set</td>
</tr>
<tr>
<td></td>
<td>7. Pour in the melted beeswax carefully until the mould is full to the top</td>
</tr>
<tr>
<td></td>
<td>8. Watch the wax level and if it drops then add a little more wax immediately</td>
</tr>
<tr>
<td></td>
<td>9. Leave undisturbed until it is set. This is best left until the next day.</td>
</tr>
<tr>
<td></td>
<td>10. Remove the supporting stick at the top and release the candle from the mould by removing the bottom block and pushing it out</td>
</tr>
<tr>
<td></td>
<td>11. Pack beeswax candles</td>
</tr>
<tr>
<td></td>
<td>12. Label beeswax candles</td>
</tr>
</tbody>
</table>

Performance standards*:
- Control temperature to 60 degrees Celsius
- Use standard measurements for the wick and mould
- Ensure that you do not touch molten beeswax
- Maintain good hygiene in the working environment

Related knowledge:
- Explain how bees make beeswax
- Discuss the process of beeswax extraction
- State reasons for producing beeswax candles
- Explain how beeswax candles are produced
- Discuss the qualities of good beeswax candles

Required tools, equipment and materials:
- Soap, fuel, beeswax mould and wick, protective wear, heat source

Safety concerns:
- Keep beeswax away from direct contact with fire
- Do not touch molten beeswax
- Keep the process out of reach of children

Errors**:
- Poor quality beeswax products
- Financial losses

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 2.3: 

Clean propolis

Module purpose: At the end of this module, the trainees will be able to clean and store propolis.

Approximate training duration of this module: 5 days (1 week)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.3.1 Remove impurities from propolis

Figure 63: Breaking and removing impurities from crude propolis
Practical Exercise 2.3.1:
Remove impurities from propolis

| Steps involved | 1. Break propolis into small pieces e.g. by using the hand when soft or knife if it is hard  
2. Carefully pick impurities from the propolis  
3. Pack, label and store the propolis in a cool dry place |
|----------------|--------------------------------------------------------------------------------------------------|
| Performance standards* | • Clean propolis in place  
• Store propolis in a cool air tight container |
| Related knowledge: | • Discuss how bees collect propolis  
• Explain the uses of propolis to bees and humans  
• Explain how to store propolis |
| Required tools, equipment and materials: | • Knife, hammer, table, container (air tight), gloves |
| Safety concerns: | • Put on protective wear  
• Maintain/ keep the environment clean  
• Store the propolis in a pest fee room |
| Errors**: | • Injuries from poor handling of knife or hammer  
• Production of poor quality products |

*observable and measurable criteria,  **what may result if incorrect decisions are made
MODULE 2.4:

Perform moderate entrepreneurship tasks

Module purpose: At the end of this module, the trainees will be able to perform moderate salesmanship and customer care tasks as well as marketing of bee hive products.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
2.4.1 Perform moderate salesmanship tasks
2.4.2 Perform marketing tasks
2.4.3 Provide customer care
Practical Exercise 2.4.1:
Perform moderate salesmanship tasks

Steps involved
1. Apply communication skills
2. Maintain sales records
3. Update administrative records
4. Supervise staff
5. Prepare work schedules

Performance standards*
• High sales of bee hive products
• Successful beekeeping business

Related knowledge:
• Discuss the challenges in running a hive product processing business
• Explain the purpose of developing a marketing plan
• Discuss the sources of funding
• List the components of a sales proposal
• Discuss hiring and managing of employees
• Describe the procedure of updating sales records
• Discuss the types and channels of communication
• List types of sales and administrative records used in hive products processing

Required tools, equipment and materials:
• Paper, pens, computer, printer and telephone

Safety concerns:
• Observe safety and environmental precautions

Errors**: 
• No or few customers attracted to the business
• Low sales
• Losses in the business

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 2.4.2:
Perform marketing tasks

Steps involved
1. Advertise hive products
2. Conduct market research
3. Develop a market proposal

Performance standards*
• Increased sales
• Increased stock
• Regular customers

Related knowledge:
• Explain the importance of developing a market plan
• List the components of a market plan
• Describe the procedure of conducting a market research

Required tools, equipment and materials:
• Paper, pens, telephone, computer, printer

Safety concerns:
• Observe safety and environmental precautions
Errors**: • Low sales of bee hive products  
• Financial losses in the business  

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 2.4.3: Provide customer care

| Steps involved | 1. Create awareness on bee hive products  
| 2. Create good communication channels with customers  
| 3. Provide after sales services  
| 4. Conduct service evaluation |

| Performance standards*: | • Satisfied customers  
| • Growing business |

| Related knowledge: | • Describe how to retain customers  
| • Discuss the importance of customer care  
| • Describe how to measure customer satisfaction  
| • List the methods of handling customer complaints |

| Required tools, equipment and materials: | • Paper, pens, telephone, computer, printer |

| Safety concerns: | • Observe safety and environmental precautions |

| Errors**: | • Low sales  
| • Losses in the business  
| • Low customer attraction and retention |
Job title: Bee Hive Product Processor

Occupational Level 3

Description:
A hive product’s processor level 3 is a person who processes hive products (honey, beeswax, propolis) to further various forms using modern technology.

Modules
3.1: Make honey-based products
3.2: Make beeswax products
3.3: Make propolis products
3.4 Perform advanced entrepreneurship tasks
MODULE 3.1:

Produce honey-based products

Module purpose: At the end of this module, the trainee will be able to process wine, body cream and vinegar from honey.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.1.1: Make honey wine
3.1.2: Make honey vinegar
3.1.3: Make honey body cream
Practical Exercise 3.1.1:
Make honey wine

| Steps involved | 1. Clean and sterilize all equipment/tools  
|                | 2. Prepare materials e.g. honey, fruits, yeast and water.  
|                | 3. Boil water and mix the materials in a wine fermentation bin(container)  
|                | 4. Add yeast and stir  
|                | 5. Cover the fermentation bin and place an airlock  
|                | 6. Ferment for at least 21 days  
|                | 7. Siphon the wine and ferment for additional 2 months  
|                | 8. Siphon for the second time  
|                | 9. Sulphite and stabilize the wine  
|                | 10. Clear the wine by removing all yeast and other residues  
|                | 11. Keep the wine for at least 6 months  
|                | 12. Bottle and pack the wine (see figure 65)  

Performance standards*:  
- Wine should be clear (no residues)  
- Have wine flavour  

Related knowledge:  
- Explain process of wine fermentation  
- Explain different ingredients for wine formation and their uses  
- Discuss other raw materials combined with honey to make good wine  

Required tools, equipment and materials:  
- Fermentation bins, alcohol meter, honey, yeast, cleanser, hydrometer, weighing scale, saucepans/water heaters, wine bottles, wine filters, capping machine, wine cellars, food protective wear, PH meter, siphoning tube, corks/stoppers, shrink capsules, stirring rod, labels  

Safety concerns:  
- Observe hygiene throughout the process  
- Keep the environment clean  
- Containers must be covered always  
- Restrict entry to the premises  

Errors*:  
- Poor quality wine  
- Financial losses  

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 3.1.2:
Make honey cream

<table>
<thead>
<tr>
<th>Steps involved</th>
</tr>
</thead>
</table>
| Prepare ingredients e.g. essential oil, honey, glycerin, additives  
| Weigh ingredients and put in a container e.g. essential oil/shear nut butter, honey and glycerin  
| Briefly warm and mix the ingredients thoroughly (do not warm honey beyond 45 °C)  
| Add additives (colours, aroma, scent)  
| Cool, pack and label before storing in a cool dry place (see figure 66)  

Performance standards*:  
- Attractive aroma  
- Smooth texture
Practical Exercise 3.1.3:
Make honey vinegar

Steps involved
• Prepare the materials e.g. collect water, honey wine
• Measure ingredients and put in a container e.g. water and honey wine
• Add mother vinegar to the mixture
• Stir the mixture to allow in bacteria
• Allow the mixture to bubble
• Pour the mixture into a bucket
• Keep stirring the mixture for 2 days to allow oxygen to enter
• Ferment the mixture for 2 months (stirring once daily)
• Filter the mixture with filter paper and collect the honey vinegar
• Package and label the honey vinegar

Performance standards*
• Clear and mature vinegar produced

Related knowledge
• Explain process of making honey vinegar
• Discuss the uses of honey vinegar

Required tools, equipment and materials:
• Bucket, stirring rod, water, mother vinegar, weighing scale, honey wine, buckets, bottles, protective wear, labels

Safety concerns
• Keep the environment clean
• Restrict entry to the processing room
• Maintain hygiene throughout the process

Errors**
• Poor quality vinegar
• Financial losses

*observable and measurable criteria, **what may result if incorrect decisions are made
MODULE 3.2:
Make beeswax products

Module purpose: At the end of this module, the trainee will be able to make beeswax candles, beeswax ointment and beeswax floor/furniture polish.

Approximate training duration of this module: 10 days (2 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.2.1: Make beeswax candles
3.2.2: Make beeswax ointment
3.2.3: Make beeswax floor/furniture polish
Practical Exercise 3.2.1: Make beeswax candles

| Steps involved | 1. Melt good quantity beeswax in double boiler |
|                | 2. Prepare the mould by rubbing the inside with soap so the wax does not stick to the mould |
|                | 3. Position the wick carefully in the centre of the candle mould |
|                | 4. The wick should be clipped at the top so that it rests on the top of the mould to keep it in place. Two small pieces of stick cut part way through are sufficient to keep the wick in the middle of the mould from the bottom |
|                | 5. Put the mould securely in place where it will not be disturbed before the wax is set. This will be several hours |
|                | 6. It may be helpful to stand the mould in a tin of cold water. This will give it stability and also help it to set |
|                | 7. Pour in the molten beeswax carefully until the mould is full to the top |
|                | 8. Watch the wax level and if it drops then add a little more wax immediately |
|                | 9. Leave undisturbed until it is set. This is best left until the next day |
|                | 10. Remove the supporting stick at the top and release the candle from the mould by removing the bottom block and pushing it out |

| Performance standards* | Candles should be free from impurities |
|                       | Wick should be in the middle |
|                       | The size of candles should conform with the size of the wick |

| Related knowledge | Discuss the properties of beeswax |
|                  | Explain the process of beeswax production by bees |
|                  | Explain the process of beeswax candle making |
|                  | Mention other materials that can add value to beeswax candle making e.g. insect repellent and scent |
|                  | Discuss the different sizes and shapes of candles for different occasions e.g. birthday, Christmas, Easter, etc |

| Required tools, equipment and materials: | Candle wick, beeswax, mould, saucepan, rubber band, fuel, source of fire, wick holder (2 pieces of stick), scent, mosquito repellent, protective wear, 2 pieces of sticks |

| Safety concerns: | Beeswax is flammable (precaution should be taken not to overheat) |
|                 | Avoid touching molten beeswax |
|                 | Avoid spilling molten beeswax |
|                 | Clean the working environment |
|                 | Restrict entry to the processing room |

| Errors**: | Poor quality candles |
|          | Financial losses |

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 3.2.2:
Make beeswax ointment

| Steps involved | • Prepare materials e.g. a pan of boiling water over the fire  
|                | • In a clean tin put all the ingredients except water  
|                | • Heat the tin over the boiling water until all the oils and wax are melted together  
|                | • In a second clean tin mix the borax with the scented/herbal water (scented or herbal water is obtained by boiling herbs or leaves in the water first then straining it carefully)  
|                | • Heat the wax tin in the double boiler until the wax mixture is ready  
|                | • The temperature of the liquids in both containers should be the same  
|                | • Prepare another clean tin and stirrer  
|                | • Remove the wax tin from the heat and pour all the molten wax and oils into the third container/tin  
|                | • Very quickly pour the scented water mixture into the wax mixture stirring continuously without stopping until the mixture becomes thick  
|                | • Put the ointment into small packs before it cools  
|                | • Label the ointment in the packs (see figure 67)  

| Performance standards* | • Soft texture of ointment  
|                        | • Good smell from the cream/ointment  

| Related knowledge | • Explain the process of making beeswax ointment  
|                   | • List other materials used to add value to the beeswax ointment  
|                   | • Discuss the uses of the beeswax ointment  

| Required tools, equipment and materials: | • Bees wax, essential oil, saucepan, packaging materials, heat source, herbs, water, aroma, colour, protective wear, stirring rod, labels  

| Safety concerns | • Beeswax is flammable and precaution should be taken not to over heat  
|                | • Avoid touching molten beeswax  
|                | • Avoid burning yourself with heated mixture  

| Errors** | • Poor quality products due to over heating  
|          | • Financial losses  
|          | • Accidents due to burning  

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 3.2.3:
Make beeswax floor/furniture polish

Figure 68: Beeswax furniture polish
| **Steps involved**          | • Measure materials e.g. beeswax, genuine turpentine  
|                            | • Melt beeswax in double boiler  
|                            | • When melted, pour quickly into a container  
|                            | • Quickly stir the turpentine into the wax  
|                            | • Keep stirring fast and do not stop stirring until the mixture thickens  
|                            | • Pour into suitable containers and label attractively |
| **Performance standards**  | • Polish should not be very soft  
|                            | • Can make glittering surface |
| **Related knowledge**      | • Explain the process of making beeswax floor/furniture polish  
|                            | • Describe the properties of beeswax floor/furniture polish |
| **Required tools, equipment and materials:** | • Beeswax, turpentine, saucepans, container, sieving material, labels, water, protective wear, stirring rod |
| **Safety concerns**        | • Avoid accidents like burns by putting on gloves and other protective wear |
| **Errors**                 | • Poor quality products  
|                            | • Financial losses |

*observable and measurable criteria, **what may result if incorrect decisions are made*
MODULE 3.3: Make propolis products

**Module purpose:** At the end of this module, the trainee will be able to make propolis tincture and propolis ointment.

**Approximate training duration of this module:** 30 days (6 weeks)

*[It is understood that the average training duration is contact time (training under trainer’s guidance)]*

**Practical Exercises:**
3.3.1: Make propolis tincture
3.3.2: Make propolis ointment

*Figure 69: Crude propolis*
### Practical Exercise 3.3.1:
**Make propolis tincture**

#### Steps involved

1. Clean crude propolis  
2. Break propolis into small pieces  
3. Soak propolis in ethanol (ethanol 96% for topical uses and 75% for oral)  
4. Keep the mixture in a dark room and shake daily at least three times for one month  
5. Filter, package and label after at least 3 weeks  
6. Store propolis tincture in a dark room/containers

#### Performance standards*:
- The solid propolis reduces in size/dissolves  
- Dark coloured liquid/tincture is formed

#### Related knowledge:
- Discuss the sources of propolis  
- Explain the process of collecting propolis  
- Explain the steps taken to make propolis tincture  
- Explain the uses of propolis tincture

#### Required tools, equipment and materials
- Soaking container (food grade), knife, pieces of wood, hammer, ethanol, alcohol-meter, strainer, filter papers, bottling containers, protective wear e.g. gloves and apron, propolis, labels

#### Safety concerns
- Put on gloves and apron to avoid propolis dirtening your clothes

#### Errors:
- Accidents may occur  
- Poor quality product  
- Financial losses

---

*observable and measurable criteria,  **what may result if incorrect decisions are made
Practical Exercise 3.3.2:

Make propolis ointment

Steps involved

1. Prepare materials e.g. a pan of boiling water over the fire
2. Put all the ingredients except water, in a clean pan
3. Heat the pan until all the oils and wax are melted together (double boiling method)
4. In a second clean pan mix the propolis tincture, and scented herbal water
5. Heat the wax pan in the double boiler until the wax mixture is ready
6. Prepare another clean pan and pour the molten beeswax and oil there after followed by the propolis tincture mixture
7. Stir the mixtures continuously without stopping until the mixture becomes thick
8. Pack the ointment into small packs before it cools
9. Label the ointment in the packs

Performance standards*

• Ointment produced has smooth surface and can easily be applied on skin
• Mild smell

Related knowledge:

• Explain steps taken in making propolis ointment
• Discuss the uses of propolis ointment

Required tools, equipment and materials

• Saucepans, propolis tincture, heat source, essential oils, colour, aroma, protective wear, packaging containers, labels

Safety concerns

• Avoid touching molten material such as beeswax
• Put on protective wear

Errors**

• Poor quality product
• Financial losses
• Accidents arising from heat

*observable and measurable criteria,  **what may result if incorrect decisions are made
MODULE 3.4:
Perform advanced entrepreneurship Tasks

Module purpose: At the end of this module, the trainee will be able to prepare a business plan and analyse profits from the business.

Approximate training duration of this module: 20 days (4 weeks)

[It is understood that the average training duration is contact time (training under trainer’s guidance)]

Practical Exercises:
3.4.1: Prepare a business plan
3.4.2: Conduct a profitability analysis
Practical Exercise 3.4.1: Prepare a business plan

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Decide the form of business (choose your business location)</td>
<td></td>
</tr>
<tr>
<td>• Define the mission and vision of the business</td>
<td></td>
</tr>
<tr>
<td>• Decide the objectives of the business</td>
<td></td>
</tr>
<tr>
<td>• Understand your financial options (requirements)</td>
<td></td>
</tr>
<tr>
<td>• Decide on the business structure (organogram)</td>
<td></td>
</tr>
<tr>
<td>• Decide on the marketing strategy to be employed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance standards*:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• A completed standard business plan</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related knowledge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Explain to the process of conducting market research</td>
<td></td>
</tr>
<tr>
<td>• Discuss on how to calculate profits and losses</td>
<td></td>
</tr>
<tr>
<td>• Explain how cash flow statements are developed</td>
<td></td>
</tr>
<tr>
<td>• Discuss how budgeting is done</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required tools, equipment and materials</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Computer, printer, telephone, paper, pens</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety concerns</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Clear and organize working environment</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Errors**:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Financial losses</td>
<td></td>
</tr>
<tr>
<td>• Wrong market targeted</td>
<td></td>
</tr>
</tbody>
</table>

*observable and measurable criteria, **what may result if incorrect decisions are made

Practical Exercise 3.4.2: Conduct a profitability analysis

<table>
<thead>
<tr>
<th>Steps involved</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify costs involved in the business</td>
<td></td>
</tr>
<tr>
<td>• List down the revenues of the business</td>
<td></td>
</tr>
<tr>
<td>• Calculate the profit by subtracting the total costs from the total revenue</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance standards*:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Profitability analysis report produced</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related knowledge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Explain the importance of record keeping</td>
<td></td>
</tr>
<tr>
<td>• Discuss how budgeting is done</td>
<td></td>
</tr>
<tr>
<td>• Describe how taxes are calculated and determined</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required tools, equipment and materials</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Computer, printer, telephone, paper, pens</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety concerns</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Clear and organize the working environment</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Errors**:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Financial losses</td>
<td></td>
</tr>
<tr>
<td>• Over/under estimation of profits and losses</td>
<td></td>
</tr>
</tbody>
</table>

*observable and measurable criteria, **what may result if incorrect decisions are made
3.0 INFORMATION ON DEVELOPMENT PROCESS:

1. **Occupational Profile Development**
   The Occupational Profile was developed by job practitioners and MAAIF officials who are working in the occupation of either Bee Equipment Manufacturer, Beekeeper, Bee Hive Product Processor. Each occupation/job had four experts involved. The job expert panel, guided by DACUM Consultants, defined duties and tasks performed.

2. **Training Module Development**
   Based on the Occupational Profile for Bee Equipment Manufacturer, Beekeeper and Bee Hive Product Processor, training modules were adapted from the original manual, new ones developed and others combined by combined panels of trainers, job practitioners and MAAIF officials guided by the Consultants.

3. **Methodology**
   The rationale for the Training Modules development is to link Vocational Education and Training to the real world of work by bridging Occupational Standards to training standards through industry-led standards-based assessment.

   Active participation of both public and private trainers/practitioners consolidated the development philosophy.

   The panellists worked as teams in workshop settings complemented by off-workshop field research.
# List of participants (Development process)

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Personal mobile telephone number(s)</th>
<th>Personal e-mail address</th>
<th>Work place (organisation) and address</th>
<th>Occupation/Job title:</th>
<th>Years of working experience in occupation/job:</th>
<th>Area of specialisation (Equipment manufacturing, production, processing others):</th>
<th>Title of present Occupation/Job</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chanda Adam</td>
<td>0782319905 0702201145</td>
<td><a href="mailto:chandiaadam8@gmail.com">chandiaadam8@gmail.com</a></td>
<td>Butuntumula Area Cooperative Enterprise/Sulma Foods Co Ltd P.O.Box 102, Luweero</td>
<td>Bee Keeping, Equipment/ Product Processing and Value addition</td>
<td>15 Years</td>
<td>Equipment Manufacturing And Product Processing</td>
<td>Director/Project Supervisor/Extension Officer</td>
</tr>
<tr>
<td>2</td>
<td>Aturinde Elly</td>
<td>078367330</td>
<td><a href="mailto:atulindee@yahoo.com">atulindee@yahoo.com</a></td>
<td>Golden Bees Ltd</td>
<td>General Manager</td>
<td>5 Years</td>
<td>Processing</td>
<td>Beekeeper</td>
</tr>
<tr>
<td>3</td>
<td>Ayatuhaire Asaph</td>
<td>0772551828</td>
<td><a href="mailto:Mugula005@yahoo.com">Mugula005@yahoo.com</a></td>
<td>West Honeys Uganda (Biharwe - Mbarara) P.O.Box 1699, Mbarara (U)</td>
<td>Beekeeper and Bee Product Seller</td>
<td>34 Years</td>
<td>Beekeeping and Packaging</td>
<td>Beekeeper</td>
</tr>
<tr>
<td>4</td>
<td>Mugula George</td>
<td>0772860695 0701860695</td>
<td>Bee House Products Ltd Piot 582 Rd, Kigowa, Ntinda P.O.Box 74808, Kampala</td>
<td>Managing Director</td>
<td>Processing And Equipment Manufacturing Consultancy</td>
<td>3 Years</td>
<td>Managing Director</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Patrice Kasangaki</td>
<td>0772693241 0702693241</td>
<td><a href="mailto:pkasangaki@gmail.com">pkasangaki@gmail.com</a></td>
<td>National Livestock Resources Institute (NAL-IRRI) P.O. BOX 96 TORORO</td>
<td>Entomologist</td>
<td>13 Years</td>
<td>Honey Bee Research</td>
<td>Apiculture Scientist (Research Officer)</td>
</tr>
<tr>
<td>6</td>
<td>Kangave Alice</td>
<td>0712273059</td>
<td><a href="mailto:akangave8@utlonline.co.ug">akangave8@utlonline.co.ug</a> <a href="mailto:akangave1234@gmail.com">akangave1234@gmail.com</a></td>
<td>Ministry Of Agriculture, Animal Industry And Fisheries</td>
<td>Entomologist</td>
<td>29 Years</td>
<td>Production, Processing, Policy Regulation</td>
<td>Principal Entomologist</td>
</tr>
<tr>
<td>7</td>
<td>Orupia Stephen</td>
<td>0782613761</td>
<td>Sorotti (Agaria)</td>
<td>Beekeeper</td>
<td>7 Years</td>
<td>Making Bee Hives</td>
<td>Bee Keeping</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Kisaali Bosco</td>
<td>0392943018</td>
<td><a href="mailto:kisaali.mebkc@yahoo.com">kisaali.mebkc@yahoo.com</a></td>
<td>Mt.Elgon Beekeeping Community (Mebkc Ngo) Sironko Eastern Uganda</td>
<td>Equipment, Beekeeper And Trainer</td>
<td>25 Years</td>
<td>Training</td>
<td>Equipment Trainer And Beekeeper</td>
</tr>
<tr>
<td>9</td>
<td>Cosmas Alfred Butele</td>
<td>0793401045</td>
<td><a href="mailto:cosmasalfred2000@yahoo.com">cosmasalfred2000@yahoo.com</a></td>
<td>Ministry Of Agriculture, Animal Industry And Fisheries (MAAIF) Head Quarters P.O.Box 34518 KAMPALA</td>
<td>Entomologist</td>
<td>14 Years</td>
<td>Policy And Planning, Supervision And Technical Backstopping In Bee Keeping</td>
<td>Senior entomologist</td>
</tr>
<tr>
<td>10</td>
<td>Mrs. Christine Ogwang</td>
<td>07122856649 0784459777</td>
<td><a href="mailto:gateshoney@gmail.com">gateshoney@gmail.com</a></td>
<td>Gate's Honey Akitenino Village Omoto Parish Adyel Division La Ngo (Sub Region ) Lira District P.O.Box 24854, Kampala</td>
<td>Director/Processor</td>
<td>5 Years</td>
<td>Production, Processing And Marketing</td>
<td>Director</td>
</tr>
<tr>
<td>#</td>
<td>Name</td>
<td>Personal mobile telephone number(s)</td>
<td>Personal e-mail address</td>
<td>Work place (organisation) and address</td>
<td>Occupation/Job title:</td>
<td>Years of working experience in occupation/job:</td>
<td>Area of specialisation during QA (Equipment manufacturing, production, processing):</td>
<td>Title of present Occupation/Job</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------</td>
<td>------------------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Margaret R.A. Ogaba</td>
<td>0772575033</td>
<td><a href="mailto:margsrose@yahoo.com">margsrose@yahoo.com</a></td>
<td>Jiima Holdings Ltd, Lower Palabek Rd, P.O.Box 66 Kitgum And Palabek Town Board- Dpa Palabek Lamwo District</td>
<td>Farmer Beekeeper/ Processor/ Managing Director</td>
<td>20 Years</td>
<td>Processing</td>
<td>Managing Director of Jiima Holdings</td>
</tr>
<tr>
<td>12</td>
<td>Mugisha Elly</td>
<td>0772627874</td>
<td><a href="mailto:connoisserhuines@yahoo.com">connoisserhuines@yahoo.com</a></td>
<td>Bushenyi/ Connoisseur “Honey” Co-operative Society</td>
<td>Beekeeper/ Trainer</td>
<td>35 Years</td>
<td>Processing</td>
<td>Managing Director</td>
</tr>
<tr>
<td>13</td>
<td>Bagonza Adolph</td>
<td>0772373716 0702319341</td>
<td><a href="mailto:adophbagonza@yahoo.com">adophbagonza@yahoo.com</a></td>
<td>Kabalore Beekeepers Association Limited P.O.Box 803 Fort Portal</td>
<td>Beekeeper/ Executive Director</td>
<td>27 Years (Since 1986)</td>
<td>Bee Keeping, Processing and Training</td>
<td>Executive Director</td>
</tr>
<tr>
<td>14</td>
<td>Adrole Ajua Eschol</td>
<td>0775127140</td>
<td></td>
<td>Terego Bee Farmers’ Association</td>
<td>Bee Farmering</td>
<td>10 Years</td>
<td>Hive Construction</td>
<td>Chairman</td>
</tr>
<tr>
<td>15</td>
<td>Moses Chemurot</td>
<td>0782285819 0752285819</td>
<td><a href="mailto:moses-chemurot@gmail.com">moses-chemurot@gmail.com</a></td>
<td>Adjumani</td>
<td>Entomologist</td>
<td>5 Years</td>
<td>Bee Framer Training</td>
<td>Senior Entomologist</td>
</tr>
</tbody>
</table>

List of participants (Quality Assurance process)

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Personal mobile telephone number(s)</th>
<th>Personal e-mail address</th>
<th>Work place (organisation) and address</th>
<th>Occupation/Job title:</th>
<th>Years of working experience in occupation/job:</th>
<th>Area of specialisation during QA (Equipment manufacturing, production, processing):</th>
<th>Title of present Occupation/ Job</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jurua. M. Jackson</td>
<td>0774680445</td>
<td><a href="mailto:jjurua@gmail.com">jjurua@gmail.com</a></td>
<td>TUNADO</td>
<td>Chairman</td>
<td>5 Years</td>
<td>Manufacturer</td>
<td>Chairman</td>
</tr>
<tr>
<td>2</td>
<td>Kaddu John</td>
<td>0712567395</td>
<td><a href="mailto:jonebees@yahoo.co.uk">jonebees@yahoo.co.uk</a></td>
<td>Kaddu John Ltd</td>
<td>Equipment Manufacturer</td>
<td>28 Years since 1986</td>
<td></td>
<td>Director</td>
</tr>
<tr>
<td>3</td>
<td>Chemurot Moses</td>
<td>0782285819</td>
<td><a href="mailto:mosechemurot@gmail.com">mosechemurot@gmail.com</a></td>
<td>M.U.K</td>
<td>Lecturing</td>
<td>10 Years</td>
<td>Entomologist</td>
<td>Lecturer</td>
</tr>
<tr>
<td>4</td>
<td>Ainebyona Clives</td>
<td>0701968270</td>
<td><a href="mailto:clivesaine@gmail.com">clivesaine@gmail.com</a></td>
<td>Aine’e Investments</td>
<td>Processor and Packer</td>
<td>6 Years</td>
<td></td>
<td>Director of Aine’ve Investments</td>
</tr>
<tr>
<td>5</td>
<td>Bugaari Ambrose</td>
<td>0752573900</td>
<td><a href="mailto:ambrose._bugaari@yahoo.com">ambrose._bugaari@yahoo.com</a></td>
<td>ESDC Ntinda ESDC</td>
<td>Consultant ESDC</td>
<td>15 Years</td>
<td>Honey Value Chain specialist</td>
<td>Director of ESDC</td>
</tr>
<tr>
<td>6</td>
<td>Kangave Alice</td>
<td>0712273059</td>
<td><a href="mailto:akangave@utonline.co.ug">akangave@utonline.co.ug</a></td>
<td>Ministry of Agriculture, Animal Industry and Fisheries P.O. Box 34518 Kampala</td>
<td>Entomologist</td>
<td>29 Years</td>
<td></td>
<td>Principal Entomologist</td>
</tr>
<tr>
<td>7</td>
<td>Biryomumaisho Dickson</td>
<td>0782891933</td>
<td><a href="mailto:bidicks@yahoo.co.uk">bidicks@yahoo.co.uk</a></td>
<td>TUNADO</td>
<td>Honey value chain specialist</td>
<td>8 Years</td>
<td></td>
<td>Executive Director</td>
</tr>
<tr>
<td>#</td>
<td>Name</td>
<td>Personal mobile telephone number(s)</td>
<td>Personal e-mail address</td>
<td>Work place organisation and address</td>
<td>Occupation/ Job title:</td>
<td>Years of working experience in occupation job:</td>
<td>Area of specialization during QA (Equipment manufacturing, production, processing)</td>
<td>Title of present Occupation/ Job</td>
</tr>
<tr>
<td>----</td>
<td>-----------------------</td>
<td>-------------------------------------</td>
<td>-------------------------</td>
<td>--------------------------------------</td>
<td>------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Kisaali Bosco</td>
<td>0392943018</td>
<td><a href="mailto:kisaali.mebkc@yahoo.com">kisaali.mebkc@yahoo.com</a></td>
<td>Mt. Elgon Beekeeping Community (Mebkc Ngo) Sironko Eastern Uganda</td>
<td>Equipment, Beekeeper and Trainer</td>
<td>25 Years</td>
<td>Manufacturer</td>
<td>Equipment Trainer and Beekeeper</td>
</tr>
<tr>
<td>9</td>
<td>Cosmas Alfred Butele</td>
<td>0793401045</td>
<td><a href="mailto:cosmasalfred2000@yahoo.com">cosmasalfred2000@yahoo.com</a></td>
<td>Ministry Of Agriculture, Animal Industry And Fisheries (MAAIF) Head Quarters</td>
<td>Entomologist</td>
<td>14 Years</td>
<td>Beekeeper</td>
<td>Senior Entomologist</td>
</tr>
<tr>
<td>10</td>
<td>Christine Ogwang</td>
<td>0712856649/078449777</td>
<td><a href="mailto:gate-shoney@gmail.com">gate-shoney@gmail.com</a></td>
<td>Gate’s Honey, Akitenino Village Orito Parish Adyel Division Lango Sub Region Lira District P.O.Box 24854, Kampala</td>
<td>Director/Processor</td>
<td>5 Years</td>
<td>Processor</td>
<td>Director</td>
</tr>
<tr>
<td>11</td>
<td>Margaret R.A.Ogaba</td>
<td>0772575033</td>
<td><a href="mailto:margroseo@yahoo.com">margroseo@yahoo.com</a></td>
<td>Jjlima Holdings Ltd, Lower Palabek Rd, P.O.Box 66 Kilgum And Palabek Town Board- DPA Palabek Lwambo District</td>
<td>Farmer Beekeeper/ Processor/ Managing Director</td>
<td>20 Years</td>
<td>Processor</td>
<td>Managing Director</td>
</tr>
<tr>
<td>12</td>
<td>Bagonza Adolph</td>
<td>0772373716/0702319341</td>
<td><a href="mailto:adoph-bagonza@yahoo.com">adoph-bagonza@yahoo.com</a></td>
<td>Kabarole Beekeepers Association Limited P.O.Box 803 Fort Portal</td>
<td>Beekeeper/ Executive Director</td>
<td>27 Years (Since 1986)</td>
<td>Beekeeper</td>
<td>Executive Director</td>
</tr>
</tbody>
</table>

Reference
### Common Beekeeping Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absconding</strong></td>
<td>This occurs when all honey bees leave the hive or nest</td>
</tr>
<tr>
<td><strong>Apiary</strong></td>
<td>The site where a number of colonized hives are kept</td>
</tr>
<tr>
<td><strong>Apiary hygiene</strong></td>
<td>Is keeping apiary clean</td>
</tr>
<tr>
<td><strong>Apiary inspection</strong></td>
<td>Routine observation of what is going on in and around the apiary</td>
</tr>
<tr>
<td><strong>Apiculture</strong></td>
<td>The science and art of bees and beekeeping</td>
</tr>
<tr>
<td><strong>Bark hive</strong></td>
<td>Is a type of traditional or local hive made out of the bark of trees which can be built in a cylindrical or other shape</td>
</tr>
<tr>
<td><strong>Basket hive</strong></td>
<td>Is a woven hive made out of various locally available materials</td>
</tr>
<tr>
<td><strong>Bee bread</strong></td>
<td>Is a product of pollen and honey to make a dough stored as food for the bees</td>
</tr>
<tr>
<td><strong>Bee brood</strong></td>
<td>It includes eggs, larvae and pupa in a comb</td>
</tr>
<tr>
<td><strong>Bee brush</strong></td>
<td>Used to brush off bees from the honey comb during inspection or harvesting</td>
</tr>
<tr>
<td><strong>Bee calendar</strong></td>
<td>Is what happens inside the hive all year round</td>
</tr>
<tr>
<td><strong>Bee Forage</strong></td>
<td>Plants which provide pollen, nectar, honey dew and propolis for the colony</td>
</tr>
<tr>
<td><strong>Bee House</strong></td>
<td>A house specifically designed with holes on the walls that are connected to the hive entrances</td>
</tr>
<tr>
<td><strong>Beekeeper’s calendar</strong></td>
<td>Is a series of activities carried out by a Beekeeper during various seasons</td>
</tr>
<tr>
<td><strong>Bee Protective wear</strong></td>
<td>Used to protect Beekeepers from stings and comprises of an overall, bee gloves, bee veil and gum boots</td>
</tr>
<tr>
<td><strong>Bee smoker</strong></td>
<td>Is a simple device/tool used to generate smoke during hive inspection or harvesting to calm the bees</td>
</tr>
<tr>
<td><strong>Beeswax</strong></td>
<td>Wax produced by honey bees and used to build combs</td>
</tr>
<tr>
<td><strong>Bee venom</strong></td>
<td>Is a poisonous substance produced by worker and queen bees for defence</td>
</tr>
<tr>
<td><strong>Build-up</strong></td>
<td>Is a season when there are many bee forage plants and the weather is favourable, the colony expands</td>
</tr>
<tr>
<td><strong>Catcher box</strong></td>
<td>Is a small hive with about 4 to 5 frames/bars used to trap passing swarms</td>
</tr>
<tr>
<td><strong>Centrifuge extractor</strong></td>
<td>It is a machine used to extract honey from combs</td>
</tr>
<tr>
<td><strong>Comb</strong></td>
<td>This is a hanging structure built by bees out of beeswax used for rearing brood and storing honey and pollen</td>
</tr>
<tr>
<td><strong>Comb knife</strong></td>
<td>Used to cut off honey comb from a top bar or a local hive</td>
</tr>
<tr>
<td><strong>Dearth</strong></td>
<td>Is a season when not much nectar is being collected due to bad weather and poor forage</td>
</tr>
<tr>
<td><strong>Frame hive</strong></td>
<td>A hive which contains frames e.g. langstroth, dadant and smith. They all recognize the importance of bee space and use movable-frames</td>
</tr>
<tr>
<td><strong>Hive</strong></td>
<td>This is a man-made container or natural cavity or hollow in a tree/ground modified by man in which a colony lives</td>
</tr>
<tr>
<td><strong>Hive baiting</strong></td>
<td>This is an act of attracting bees into a hive by using bee attractants such as beeswax, propolis or any other suitable material</td>
</tr>
<tr>
<td><strong>Hive inspection</strong></td>
<td>Opening the hive and observing what is going on inside the hive and also what is going on outside the hive</td>
</tr>
<tr>
<td><strong>Hive tool</strong></td>
<td>Used to open the hive and loosen the bars or frames that are stuck together with propolis</td>
</tr>
<tr>
<td><strong>Honey</strong></td>
<td>A sweet viscous fluid made by bees from nectar or honey dew and stored in combs</td>
</tr>
<tr>
<td><strong>Honey bee colony</strong></td>
<td>A colony is a group of honey bees living together comprising of a queen, drones and workers</td>
</tr>
<tr>
<td><strong>Honey flow</strong></td>
<td>Is a season when many plants provide nectar and flower at the same time</td>
</tr>
<tr>
<td>Term</td>
<td>Explanation</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Honey processing</td>
<td>Is the getting of honey out of the comb</td>
</tr>
<tr>
<td>Honey refractometer</td>
<td>An instrument used to measure the moisture content of honey</td>
</tr>
<tr>
<td>Modern processing</td>
<td>Using equipment (honey press, stainless steel tanks etc) to process the honey</td>
</tr>
<tr>
<td>methods</td>
<td></td>
</tr>
<tr>
<td>Nectar</td>
<td>The sweet fluid secreted by nectaries of plants commonly in flowers that help attract bees and is the raw material from which honey is made</td>
</tr>
<tr>
<td>Propolis</td>
<td>Is a hive product made by bees from resinous substances picked from plants. It is used to seal cracks in the hive and to reduce hive entrance when necessary</td>
</tr>
<tr>
<td>Pollen</td>
<td>Are grains produced by flowers and are used as food for bees</td>
</tr>
<tr>
<td>Royal jelly</td>
<td>Nutritious substance produced by young worker bees to feed the young larvae and queen</td>
</tr>
<tr>
<td>Siting hive</td>
<td>Is placing hives in a suitable place</td>
</tr>
<tr>
<td>Solar wax extractor</td>
<td>Equipment for extracting wax using sunshine</td>
</tr>
<tr>
<td>Top bar hive</td>
<td>A design of a hive with bars on top. Top-bar hives are transitional hives between the traditional hives and the frame hives</td>
</tr>
<tr>
<td>Traditional hive</td>
<td>Is a hive which is made out of local materials available in any location e.g. log hive, clay pot hives, gourd hives, bark hives, woven twigs and mud basket hives</td>
</tr>
<tr>
<td>Watering bees</td>
<td>This is provision of water in an apiary</td>
</tr>
<tr>
<td>Queen excluder</td>
<td>A device for confining the queen to a particular section of the hive.</td>
</tr>
</tbody>
</table>