# Table III-1 Horticulture Tree Crops in the Study Area (1/2)

| | Unit | National | Lhuntse Dzongkhag: Lhuntse Dzongkhag | L 1 Gangzur | L 2 Jaray | L 3 Khoma | L 4 Kurtoe | L 5 Menbi | L 6 Metsho | L 7 Minjay | L 8 Tsenkhar |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. Production of Tree Crops** | | | | | | | | | | | |
| Apple | | | | | | | | | | | |
| Total Tree | No. | 368,388 | 1,286 | 356 | 30 | 63 | 26 | 106 | 476 | 26 | 202 |
| Bearing Tree | No. | 196,479 | 280 | 52 | 8 | | 6 | 91 | 68 | 6 | 51 |
| Production | ton | 5,113 | 11.3 | 0.5 | 0.1 | | 0.2 | 3.0 | 6.1 | 0.2 | 1.2 |
| Yield | kg/tree | 26 | 40 | 9 | 10 | | 40 | 33 | 90 | 40 | 24 |
| Orange | | | | | | | | | | | |
| Total Tree | No. | 1,761,005 | 4,810 | 1,014 | 109 | 81 | 47 | 177 | 315 | 2,163 | 903 |
| Bearing Tree | No. | 906,703 | 1,638 | 280 | 10 | 25 | 33 | 77 | 98 | 880 | 234 |
| Production | ton | 29,616 | 60.4 | 15.4 | 0.4 | 0.6 | 1.5 | 3.1 | 9.2 | 22.6 | 7.6 |
| Yield | kg/tree | 33 | 37 | 55 | 40 | 24 | 45 | 40 | 93 | 26 | 33 |
| Walnut | | | | | | | | | | | |
| Total Tree | No. | 36,729 | 1,658 | 65 | 110 | 385 | 133 | 105 | 148 | 532 | 181 |
| Bearing Tree | No. | 5,458 | 408 | 16 | 9 | 225 | 0 | 0 | 0 | 158 | 0 |
| Production | ton | 235 | 18.1 | 0.2 | 2.5 | 10.6 | 0.0 | 0.0 | 0.0 | 4.8 | 0.0 |
| Yield | kg/tree | 43 | 44 | 13 | 270 | 47 | | | | 30 | |
| Plum | | | | | | | | | | | |
| Total Tree | No. | 8,922 | 498 | 146 | <25 | 112 | 99 | 32 | | <25 | 80 |
| Bearing Tree | No. | 5,343 | 382 | 126 | * | 64 | 80 | 32 | | * | 70 |
| Production | ton | 282 | 16.1 | 4.6 | * | 5.6 | 4.5 | 0.4 | | * | 0.9 |
| Yield | kg/tree | 53 | 42 | 37 | * | 88 | 56 | 13 | | * | 12 |
| Pear | | | | | | | | | | | |
| Total Tree | No. | 12,580 | 881 | 131 | 41 | 235 | 89 | 32 | 104 | 158 | 90 |
| Bearing Tree | No. | 8,028 | 587 | 102 | 14 | 193 | 75 | 21 | 44 | 108 | 30 |
| Production | ton | 718 | 36.7 | 2.2 | 3.7 | 13.5 | 4.5 | 0.9 | 0.9 | 10.1 | 0.9 |
| Yield | kg/tree | 89 | 62 | 21 | 270 | 70 | 60 | 44 | 20 | 93 | 30 |
| Peach | | | | | | | | | | | |
| Total Tree | No. | 29,439 | 1439 | 274 | 174 | 96 | 60 | 174 | 195 | 285 | 181 |
| Bearing Tree | No. | 20,657 | 1038 | 263 | 37 | 96 | 60 | 124 | 65 | 222 | 171 |
| Production | ton | 1,091 | 39.3 | 7.2 | 1.5 | 4.8 | 0.6 | 8.1 | 2.2 | 8.0 | 6.9 |
| Yield | kg/tree | 53 | 38 | 27 | 40 | 50 | 10 | 65 | 33 | 36 | 40 |
| Guava | | | | | | | | | | | |
| Total Tree | No. | 26,927 | 500 | 87 | | | <25 | | <25 | 131 | 241 |
| Bearing Tree | No. | 17,950 | 480 | 87 | | | * | | * | 131 | 241 |
| Production | ton | 665 | 15.8 | 2.9 | | | * | | * | 3.1 | 9.3 |
| Yield | kg/tree | 37 | 33 | 33 | | | * | | * | 24 | 39 |
| Total | | | | | | | | | | | |
| Total Tree | No. | 2,601,459 | 11,072 | 2,073 | 464 | 972 | 454 | 626 | 1,238 | 3,295 | 1,878 |
| Bearing Tree | No. | 1,302,845 | 4,813 | 926 | 78 | 603 | 254 | 345 | 275 | 1,505 | 797 |
| Percent of Bearing | % | 50 | 43 | 45 | 17 | 62 | 56 | 55 | 22 | 46 | 42 |
| Production | ton | 39,050 | 198 | 33 | 8 | 35 | 11 | 15 | 18 | 49 | 27 |
| Yield | kg/tree | 30 | 41 | 36 | 104 | 58 | 44 | 45 | 67 | 32 | 34 |
| Average No. of trees per household | | | | | | | | | | | |
| Yield | tree/HH | 29 | 4.4 | 4.5 | 2.1 | 3.0 | 2.3 | 1.5 | 5.1 | 12.4 | 4.7 |

| | Unit | Mongar Dzongkhag: Mongar Dzongkhag | M 1 Balam | M 2 Chali | M 3 Chaskhar | M 4 Drametse | M 5 Drepong | M 6 Gongdue | M 7 Jurme | M 8 Kengkhar | M 9 Mongar | M 10 Ngatshang | M 11 Saleng | M 12 Serimunan | M 13 Silambi | M 14 Thangrong | M 15 Tsakaling | M 16 Tsamang |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. Production of Tree Crops** | | | | | | | | | | | | | | | | | | |
| Apple | | | | | | | | | | | | | | | | | | |
| Total Tree | No. | 1,423 | 51 | | 150 | 459 | <25 | 39 | <25 | 263 | 194 | <25 | | <25 | <25 | 66 | 149 | <25 |
| Bearing Tree | No. | 241 | 12 | | 3 | 96 | * | 21 | * | 20 | 46 | * | | * | * | 15 | | * |
| Production | ton | 12 | 0.1 | | 0.6 | 3.5 | * | 0.7 | * | 4.2 | 0.5 | * | | * | * | 0.5 | | * |
| Yield | kg/tree | 49 | 9 | | 192 | 37 | * | 36 | * | 205 | 11 | * | | * | * | 30 | | * |
| Orange | | | | | | | | | | | | | | | | | | |
| Total Tree | No. | 24,575 | 212 | 1,217 | 316 | 1,470 | 212 | 6,262 | 3,255 | 2,522 | 1,034 | 1,042 | 2,815 | 1,330 | 610 | 689 | 810 | 779 |
| Bearing Tree | No. | 11,945 | 74 | 533 | 207 | 590 | 14 | 3,294 | 2,007 | 1,354 | 224 | 352 | 1,486 | 386 | 368 | 371 | 399 | 287 |
| Production | ton | 594 | 3.9 | 23.1 | 9.6 | 19.1 | 1.3 | 180.1 | 66.1 | 63.3 | 18.9 | 33.1 | 78.6 | 20.2 | 19.4 | 19.7 | 16.1 | 21.7 |
| Yield | kg/tree | 50 | 52 | 43 | 46 | 32 | 93 | 55 | 33 | 47 | 84 | 94 | 53 | 52 | 53 | 53 | 40 | 75 |
| Walnut | | | | | | | | | | | | | | | | | | |
| Total Tree | No. | 7,092 | 257 | 518 | 931 | 474 | 77 | 30 | 799 | 232 | 485 | 305 | 609 | 317 | 345 | 194 | 109 | 1410 |
| Bearing Tree | No. | 590 | 14 | 0 | 26 | 32 | 0 | 0 | 31 | 10 | 0 | 0 | 48 | 113 | 251 | 0 | 0 | 65 |
| Production | ton | 51 | 3.6 | 0.0 | 1.6 | 2.8 | 0.0 | 0.0 | 0.7 | 0.4 | 0.0 | 0.0 | 1.2 | 15.3 | 21.7 | 0.0 | 0.0 | 4.3 |
| Yield | kg/tree | 87 | 250 | | 60 | 87 | | | 23 | 38 | | | 24 | 135 | 86 | | | 67 |
| Plum | | | | | | | | | | | | | | | | | | |
| Total Tree | No. | 1,624 | 137 | 60 | 93 | 60 | <25 | | | | 533 | 264 | <25 | 182 | | <25 | 169 | 65 |
| Bearing Tree | No. | 705 | 11 | 10 | 31 | 30 | * | | | | 200 | 234 | * | 97 | | * | 85 | 0 |
| Production | ton | 32 | 0.2 | 0.5 | 0.9 | 1.7 | * | | | | 12.3 | 8.6 | * | 4.5 | | * | 3.0 | 0.0 |
| Yield | kg/tree | 45 | 15 | 50 | 30 | 55 | * | | | | 61 | 37 | * | 47 | | * | 35 | |
| Pear | | | | | | | | | | | | | | | | | | |
| Total Tree | No. | 1,409 | <25 | 60 | <25 | 234 | 43 | | 92 | <25 | 515 | 81 | | 55 | <25 | 54 | 72 | 138 |
| Bearing Tree | No. | 878 | * | 10 | * | 184 | 21 | | 72 | * | 336 | 30 | | 14 | * | 22 | 48 | 75 |
| Production | ton | 72 | * | 0.6 | * | 8.6 | 1.6 | | 9.7 | * | 29.8 | 1.1 | | 0.7 | * | 3.9 | 1.3 | 9.9 |
| Yield | kg/tree | 82 | * | 63 | * | 47 | 75 | | 136 | * | 89 | 37 | | 50 | * | 181 | 28 | 132 |
| Peach | | | | | | | | | | | | | | | | | | |
| Total Tree | No. | 4,993 | 476 | 100 | 47 | 1460 | 390 | 115 | 338 | <25 | 621 | 343 | 97 | 339 | 327 | | 97 | 225 |
| Bearing Tree | No. | 3.409 | 309 | 80 | 16 | 1002 | 206 | 69 | 174 | * | 398 | 320 | 77 | 234 | 231 | | 72 | 201 |
| Production | ton | 232 | 16.1 | 2.3 | 1.2 | 48.8 | 17.2 | 4.1 | 12.8 | * | 55.5 | 12.0 | 2.4 | 21.3 | 4.9 | | 8.3 | 24.5 |
| Yield | kg/tree | 68 | 52 | 29 | 80 | 49 | 83 | 60 | 74 | * | 139 | 38 | 31 | 91 | 21 | | 115 | 122 |
| Guava | | | | | | | | | | | | | | | | | | |
| Total Tree | No. | 2,835 | <25 | 179 | 155 | 207 | 80 | 241 | 228 | 40 | 297 | | 870 | 42 | | 323 | 42 | 118 |
| Bearing Tree | No. | 1,934 | * | 179 | 155 | 195 | 48 | 195 | 171 | 0 | 119 | | 598 | 29 | | 151 | 29 | 54 |
| Production | ton | 99 | * | 5.7 | 22.8 | 4.1 | 2.4 | 6.0 | 6.2 | 0.0 | 2.9 | | 25.0 | 1.5 | | 17.9 | 1.5 | 2.8 |
| Yield | kg/tree | 51 | * | 32 | 147 | 21 | 50 | 31 | 36 | | 24 | | 42 | 51 | | 119 | 51 | 52 |
| Total | | | | | | | | | | | | | | | | | | |
| Total Tree | No. | 44,031 | 1,133 | 2,134 | 1,692 | 4,364 | 802 | 6,752 | 4,712 | 3,057 | 3,679 | 2,035 | 4,391 | 2,265 | 1,282 | 1,326 | 1,448 | 2,735 |
| Bearing Tree | No. | 19,751 | 420 | 812 | 438 | 2,129 | 289 | 3.618 | 2,455 | 1,384 | 1,323 | 936 | 2,209 | 873 | 850 | 559 | 633 | 682 |
| Percent of Bearing | % | 45 | 37 | 38 | 26 | 49 | 36 | 54 | 52 | 45 | 36 | 46 | 50 | 39 | 66 | 42 | 44 | 25 |
| Production | ton | 1,094 | 24 | 32 | 37 | 89 | 23 | 191 | 95 | 68 | 120 | 55 | 107 | 63 | 46 | 42 | 30 | 63 |
| Yield | kg/tree | 55 | 57 | 40 | 84 | 42 | 78 | 53 | 39 | 49 | 91 | 59 | 49 | 73 | 54 | 75 | 48 | 93 |
| Average No. of trees per household | | | | | | | | | | | | | | | | | | |
| Yield | tree/HH | 8.9 | 6.3 | 8.1 | 4.2 | 8.2 | 3.7 | 20.3 | 18.1 | 8.0 | 8.0 | 7.6 | 15.0 | 8.4 | 4.1 | 4.8 | 4.4 | 14.7 |

Source: RNR Statistics 2000

# Table III-1 Horticulture Tree Crops in the Study Area (2/2)

| | Unit | National | Lhuntse Dzongkhag | | | | | | | | | Mongar Dzongkhag | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lhuntse Dzongkhag | L 1 Gangzur | L 2 Jaray | L 3 Khoma | L 4 Kurtoe | L 5 Menbi | L 6 Metsho | L 7 Minjay | L 8 Tsenkhar | Mongar Dzongkhag | M 1 Balam | M 2 Chali | M 3 Chaskhar | M 4 Drametse | M 5 Drepong | M 6 Gongdue | M 7 Jurme | M 8 Kengkhar | M 9 Mongar | M 10 Ngatshang | M 11 Saleng | M 12 Shermuhan | M 13 Silambi | M 14 Thangrong | M 15 Tsakaling | M 16 Tsamang |
| **2. Percentage of Farm Households Growing Tree Crops** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apple | % | | 1 | 1 | 1 | 1 | 1 | 0 | 3 | | 1 | 1 | 1 | | 1 | 4 | 1 | 0 | | 1 | 2 | 1 | | 0 | 0 | 1 | | 1 |
| Orange | % | | 7 | 17 | 2 | 2 | 6 | 3 | 4 | 12 | 6 | 20 | 8 | 13 | 6 | 15 | 1 | 45 | 52 | 39 | 6 | 13 | 46 | 17 | 11 | 27 | 6 | 25 |
| Walnut | % | | 1 | 2 | 1 | | | | | 1 | 0 | 0 | | | | 1 | | 0 | 0 | 0 | | | 3 | 0 | | | | 1 |
| Plum | % | | 1 | 3 | | | 1 | | 1 | 1 | 0 | 1 | 1 | | 1 | 0 | | | | | 1 | 1 | 1 | 1 | | 1 | | 1 |
| *Pear* | % | | *2* | *2* | *7* | | *4* | | *2* | *1* | *1* | *0* | | | | *0* | | | | *1* | *0* | *0* | *2* | *1* | | | | *2* |
| Peach | % | | 2 | 3 | 8 | | 2 | | 3 | | 1 | 1 | 1 | | 1 | 1 | | | 2 | 0 | 1 | 0 | 9 | 1 | 0 | 1 | | 6 |
| Guava | % | | 1 | 3 | | | | 0 | 1 | 1 | 2 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 16 | 0 | 0 | 3 | | 2 |
| **3. Percentage of Households growing Apple and Orange by Category** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apple | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <5 trees | % | 11 | 17 | 22 | 25 | 0 | 0 | 0 | 6 | | 38 | 39 | 63 | | 0 | 28 | 67 | 0 | 0 | 33 | 64 | 33 | | 0 | 0 | 46 | 0 | 0 |
| 6 - 25 | % | 31 | 57 | 33 | 75 | 75 | 0 | 50 | 78 | | 25 | 51 | 38 | | 40 | 67 | 33 | 0 | 0 | 0 | 21 | 67 | | 0 | 0 | 54 | 0 | 0 |
| 26 - 50 | % | 20 | 13 | 33 | 0 | 0 | 0 | 0 | 0 | | 38 | 4 | 0 | | 40 | 0 | 0 | 0 | 0 | 33 | 7 | 0 | | 0 | 0 | 0 | 0 | 0 |
| 51-100 | % | 17 | 9 | 11 | 0 | 0 | 0 | 50 | 11 | | 0 | 3 | 0 | | 0 | 5 | 0 | 0 | 0 | 0 | 7 | 0 | | 0 | 0 | 0 | 0 | 0 |
| 101-250 | % | 13 | 4 | 0 | 0 | 25 | 0 | 0 | 6 | | 0 | 3 | 0 | | 20 | 0 | 0 | 0 | 0 | 33 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| >250 | % | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Orange | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <5 trees | % | 10 | 38 | 50 | 64 | 50 | 82 | 0 | 0 | 15 | 27 | 18 | 25 | 7 | 21 | 23 | 0 | 5 | 9 | 12 | 18 | 5 | 21 | 18 | 8 | 54 | 0 | 28 |
| 6 - 25 | % | 31 | 45 | 44 | 27 | 25 | 18 | 70 | 64 | 39 | 50 | 62 | 69 | 73 | 68 | 64 | 60 | 50 | 67 | 75 | 56 | 67 | 65 | 51 | 75 | 45 | 39 | 63 |
| 26 - 50 | % | 17 | 12 | 4 | 9 | 25 | 0 | 30 | 36 | 19 | 15 | 12 | 0 | 12 | 7 | 8 | 0 | 24 | 15 | 9 | 15 | 17 | 10 | 14 | 15 | 1 | 39 | 6 |
| 51-100 | % | 17 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 12 | 3 | 5 | 6 | 5 | 0 | 5 | 40 | 14 | 5 | 2 | 6 | 7 | 2 | 14 | 3 | 0 | 11 | 0 |
| 101-250 | % | 14 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 1 | 6 | 5 | 1 | 4 | 0 | 0 | 11 | 4 |
| >250 | % | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 1 | 0 | 2 | 4 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| **4. Quantities Sold of Tree Crops** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apple Quantity Sold | ton | 4,763 | 5 | 0 | 0 | | 0 | 1 | 3 | 0 | 1 | 4 | 0 | | 0 | 2 | * | 0 | * | 1 | 0 | * | | * | * | 0 | | * |
| *Percent Sold* | % | *93* | *44* | *88* | | | *44* | *20* | *51* | *44* | *54* | *32* | | | | *69* | * | | * | *17* | *48* | * | | * | * | | | * |
| Orange Quantity Sold | ton | 27,192 | 29 | 4 | 0 | 0 | 1 | 1 | 4 | 19 | 1 | 305 | 2 | 18 | 6 | 9 | 1 | 97 | 30 | 37 | 14 | 6 | 52 | 9 | 3 | 3 | 14 | 6 |
| Percent Sold | % | 92 | 48 | 23 | 28 | | 55 | 44 | 44 | 83 | 9 | 51 | 62 | 80 | 64 | 45 | 74 | 54 | 45 | 58 | 73 | 19 | 66 | 45 | 13 | 14 | 86 | 26 |
| Plum Quantity Sold | ton | 79 | 1 | 1 | * | 0 | 0 | 0 | | * | 0 | 6 | 0 | 0 | 0 | 1 | * | | | | 5 | 0 | 0 | 0 | | * | 0 | 0 |
| Percent Sold | % | 28 | 5 | 19 | * | | | | | * | | 17 | | | | 30 | * | | | | 40 | | 17 | | | * | | |
| Pear Quantity Sold | ton | 166 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 5 | * | 0 | * | 0 | 0 | | 0 | * | 5 | 0 | | 0 | * | 0 | 0 | 0 |
| Percent Sold | % | 23 | 2 | | | | | 86 | | | | 7 | * | | * | | | | | * | 17 | | | | * | | | |
| Peach Quantity Sold | ton | 108 | 3 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 13 | 0 | 1 | 0 | 0 | 5 | 0 | 0 | * | 6 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Percent Sold | % | 10 | 7 | 23 | | | | 14 | | | | 6 | | 49 | | | 31 | | | * | 11 | 3 | | | | | | |
| Guava Quantity Sold | ton | 161 | 3 | 0 | | | * | | * | 0 | 3 | 18 | * | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | | 5 | 0 | | 0 | 0 | 1 |
| Percent Sold | % | 24 | 18 | 13 | | | * | | * | | 27 | 18 | * | | 48 | | | | | | 4 | | 20 | 18 | | | 18 | 43 |
| Tree Crop Total | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Quantity Sold | ton | 32,492 | 42 | 7 | 0 | 0 | 1 | 4 | 7 | 19 | 4 | 351 | 2 | 20 | 17 | 11 | 6 | 97 | 30 | 38 | 30 | 7 | 57 | 9 | 3 | 3 | 14 | 7 |
| Percent Sold | % | 83 | 21 | 21 | 1 | 0 | 8 | 25 | 39 | 38 | 14 | 32 | 10 | 61 | 46 | 13 | 28 | 51 | 31 | 56 | 25 | 12 | 53 | 15 | 5 | 7 | 47 | 11 |
| **5. Percentage of Farm Households Selling Tree Crop Products** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apple | % | 3.1 | 0.9 | 0.3 | | | | 0.3 | 2.3 | | 0.3 | 1.0 | | | | 1.1 | 1.4 | | | 0.3 | 0.7 | 0.4 | | | | | | |
| Orange | % | 16.3 | 6.8 | 5.6 | 0.5 | | 2.8 | 1.0 | 1.4 | 3.0 | 1.2 | 19.7 | 1.6 | 11.4 | 3.6 | 4.2 | 1.4 | 21.1 | 27.2 | 21.0 | 3.9 | 4.5 | 29.4 | 6.1 | 3.3 | 3.5 | 3.3 | 12.3 |

Source: RNR Statistics 2000

# Table III-2 Tree Crops in Mongar Dzongkhag in 2001

(Unit: No. of trees)

| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Balam | Chaskhar | Chali | Drametse | Drepong | Gongdue | Jurme | Kengkhar | Mongar | Ngatshang | Saleng | Serimuhang | Silambi | Thangrong | Tsakaling | Tsamang | Total | Bearing trees | Productivity |
| Orange | 108 | 109 | 2,192 | 1,805 | 297 | 2,324 | 3,439 | 9,600 | 1,048 | 2,137 | 681 | 2,109 | 891 | 506 | 1,243 | 1,031 | 29,520 | 12,810 | approx.40kg/tree |
| Mango | 29 | 800 | 1,188 | 1,729 | 511 | 35 | 265 | 286 | 471 | 662 | 195 | 267 | 0 | 449 | 861 | 443 | 8,191 | 1,628 | approx. 30kg/tree |
| Apple | 180 | 0 | 0 | 268 | 215 | 0 | 50 | 50 | 87 | | 0 | 28 | 0 | 27 | 112 | 10 | 1,027 | 44 | 30 - 40 kg/tree |
| Apricot | 60 | 60 | 0 | 70 | 70 | 21 | 70 | 70 | 142 | 70 | 61 | 48 | 0 | 70 | 62 | 66 | 940 | 0 | not fruiting |
| Pear | 80 | 50 | 0 | 85 | 85 | 15 | 30 | 30 | 125 | 80 | 95 | 42 | 0 | 60 | 95 | 105 | 977 | 0 | not fruiting |
| Walnut | 38 | 720 | 385 | 229 | 106 | 54 | 428 | 421 | 14 | 507 | 2,520 | 420 | 164 | 668 | 433 | 720 | 7,827 | 522 | 3 - 4 kg/tree |
| Plum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 78 | 0 | 0 | 0 | 0 | 78 | na | na, Local |
| Avocado | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 5 | 0 | Local |
| Custard Apple | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 11 | 1 | na |

Source: Mongar RNR Sector

# Table III-3 Vegetable and Spice Crops in the Study Area (1/2)

| | Unit | National | Lhuntse Dzongkhag | | | | | | | | | Mongar Dzongkhag | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lhuntse Dzongkhag | L 1 Gangzur | L 2 Jaray | L 3 Khoma | L 4 Kurtoe | L 5 Menbi | L 6 Metsho | L 7 Minjay | L 8 Tsenkhar | Mongar Dzongkhag | M 1 Balam | M 2 Chali | M 3 Chaskhar | M 4 Drametse | M 5 Drepong | M 6 Gongdue | M 7 Jurme | M 8 Kengkhar | M 9 Mongar | M 10 Ngatshang | M 11 Saleng | M 12 Serimuhan | M 13 Silambi | M 14 Thangrong | M 15 Tsakaling | M 16 Tsamang |
| **1. Population and households** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Population | | 700,000 | 19.426 | 3,487 | 1,360 | 2,400 | 1,692 | 3,142 | 2,142 | 2219 | 2,984 | 44,138 | 1,614 | 1,952 | 3,095 | 4,734 | 1.733 | 3,246 | 2,141 | 3,178 | 4,544 | 2,615 | 2,718 | 2,593 | 2,812 | 2,228 | 3,132 | 1,803 |
| *Households* | | *90,000* | *2,516* | *459* | *216* | *323* | *200* | *405* | *244* | *266* | *403* | *4,966* | *181* | *262* | *401* | *534* | *217* | *333* | *260* | *384* | *461* | *268* | *293* | *269* | *311* | *274* | *332* | *186* |
| **2. Production of Vegetables and Spices** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Potato | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Area | ha | 3,122 | 38 | 8 | 6 | 4 | 6 | 4 | <1 | <1 | 8 | 241 | 34 | <1 | 6 | 97 | 9 | | 5 | 13 | 36 | 3 | 11 | 4 | <1 | 12 | <1 | 6 |
| Production | ton | 35,436 | 332 | 74 | 42 | 35 | 48 | 45 | * | * | 62 | 2,132 | 268 | * | 48 | 878 | 79 | | 47 | 104 | 353 | 37 | 92 | 27 | * | 99 | * | 61 |
| Yield | kg/ha | 11,350 | 8,629 | 9.625 | 6,459 | 9,624 | 7,927 | 12,320 | * | * | 8,064 | 8,854 | 7,798 | * | 7,420 | 9,082 | 8,861 | | 8,841 | 8.036 | 9,908 | 13,011 | 8,153 | 7,484 | * | 8,120 | * | 9,419 |
| Chili | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Area | ha | 937 | 57 | 11 | 8 | 5 | 6 | 2 | <1 | 3 | 21 | 53 | 5 | <1 | <1 | 13 | <1 | <1 | <1 | <1 | 11 | <1 | 2 | 4 | <1 | <1 | 3 | 6 |
| Production | ton | 2,849 | 151 | 27 | 10 | 19 | 13 | 8 | * | 15 | 44 | 154 | 14 | * | * | 43 | * | * | * | * | 30 | * | 9 | 4 | * | * | 9 | 24 |
| Yield | kg/ha | 3,039 | 2,652 | 2,381 | 1,303 | 3,946 | 2,306 | 3,456 | * | 4,613 | 2,038 | 2.936 | 2.960 | * | * | 3,324 | * | * | * | * | 2,685 | * | 3,746 | 981 | * | * | 2,828 | 3,947 |
| Radish | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Area | ha | 779 | 14 | 2 | 3 | <1 | <1 | 2 | <1 | <1 | 4 | 62 | <1 | <1 | <1 | 6 | 5 | <1 | <1 | <1 | 22 | <1 | 7 | <1 | <1 | 8 | <1 | 2 |
| Production | ton | 3,384 | 55 | 11 | 13 | * | * | 10 | * | * | 10 | 340 | * | * | * | 33 | 47 | * | * | * | 112 | * | 28 | * | * | 35 | * | 11 |
| Yield | kg/ha | 4,341 | 3,909 | 4,515 | 4,111 | * | * | 4,882 | * | * | 2,151 | 5,531 | * | * | * | 5,814 | 8,903 | * | * | * | 5.023 | * | 3.797 | * | * | 4,506 | * | 4,326 |
| Turnip | ton | 2,647 | * | * | * | * | * | | | * | * | * | * | * | | * | * | | | | * | | * | | | * | | |
| Beans | ton | 1,151 | 27 | 1 | 1 | 14 | | 1 | 8 | | 3 | 209 | 6 | 1 | 5 | 8 | 16 | 25 | 52 | 25 | 8 | 11 | 14 | 10 | 1 | 14 | 5 | 8 |
| Brinjal | ton | 197 | 35 | * | | 27 | | * | * | | * | 12 | 2 | * | | 1 | * | * | 2 | | 1 | * | * | | * | | * | 2 |
| Carrot | ton | 151 | * | | | | | | | | | 6 | | * | | * | * | | 2 | | * | * | * | | | * | | 313 |
| Cassava | ton | 827 | * | | | | | | | | | 40 | | * | | | | 24 | 9 | | * | | * | | | | | |
| Peas | ton | 627 | 3 | * | | | | | * | | | 22 | * | | | 3 | 0 | | * | | 10 | * | * | | | 5 | | * |
| Rajma Beans | ton | 355 | 15 | 2 | | 8 | | 1 | | * | 4 | 61 | 2 | 2 | 1 | 23 | | | 3 | 1 | | 3 | | 2 | | 6 | 11 | 6 |
| Sag | ton | 521 | 7 | * | 5 | * | * | * | * | | * | 43 | * | * | * | 2 | * | * | * | * | 21 | * | 7 | * | | 4 | * | * |
| Tomato | ton | 334 | 3 | | | * | | | | | * | 39 | 1 | 2 | | 6 | 10 | * | * | | * | * | 3 | | | 11 | * | 1 |
| Garlic | ton | 430 | 28.6 | 4.5 | * | 10.4 | 1.5 | 3.1 | * | | 5.2 | 94 | 10.9 | 3.1 | 3.1 | 24.3 | 2.0 | * | 2.7 | * | 7.6 | 16.1 | 3.9 | 5.5 | | * | 6.4 | 7.6 |
| Onion | ton | 285 | 8.9 | * | * | 2.3 | 1.5 | 2.8 | * | | 1.1 | 66 | 4.6 | 1.9 | * | 17.3 | 3.3 | 2.5 | 18.3 | | 3.6 | | * | | | 4.3 | 7.6 | 1.5 |
| Cardamom | ton | 510 | | | | | | | | | | 0.1 | | | | | | | | | <0.1 | | <0.1 | | <0.1 | | | <0.1 |
| Total production of Vegetables and Spices | ton | 49,704 | 667 | 120 | 71 | 116 | 64 | 71 | 8 | 15 | 128 | 3,218 | 309 | 10 | 57 | 1,039 | 157 | 51 | 135 | 131 | 547 | 67 | 157 | 48 | 1 | 179 | 39 | 435 |
| *Production per household* | kg/HH | 552 | 265 | 261 | 329 | 358 | 321 | 174 | 33 | 56 | 318 | 648 | 1,704 | 39 | 143 | 1,945 | 724 | 153 | 519 | 340 | 1,186 | 250 | 535 | 180 | 3 | 652 | 118 | 2,337 |
| **3. Percentage of Farm Households Growing Vegetables and Spices** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Potato | % | 20.0 | 20.4 | 38.6 | 19.7 | 10.7 | 60.3 | 14.1 | 9.1 | 3.5 | 15.8 | 25.1 | 57.4 | 8.9 | 11.2 | 59.4 | 39.7 | 0.4 | 11.6 | 12.6 | 63.3 | 10.2 | 29.8 | 9.4 | 1.9 | 11.9 | 9.1 | 39.2 |
| Radish | % | 17.1 | 8.9 | 18.1 | 16.1 | 2.4 | 18.4 | 3.0 | 6.4 | 0.5 | 8.0 | 20.5 | 21.3 | 8.9 | 7.6 | 22.1 | 49.5 | 6.3 | 6.8 | 3.7 | 53.4 | 5.3 | 55.5 | 4.0 | 3.0 | 40.1 | 8.8 | 29.8 |
| Sag | % | 8.2 | 1.9 | 3.4 | 5.2 | 0.5 | 0.7 | 1.0 | 1.4 | | 2.1 | 9.7 | 16.9 | 0.8 | 1.0 | 17.2 | 36.9 | 0.4 | 2.4 | 0.3 | 21.6 | 0.4 | 24.9 | 1.3 | | 19.6 | 2.9 | 5.8 |
| Beans | % | 6.2 | 4.5 | 5.9 | 5.7 | 4.9 | 16.3 | 2.3 | 1.8 | 2.0 | 2.4 | 11.6 | 3.3 | 1.3 | 0.3 | 15.1 | 4.7 | 9.8 | 31.6 | 36.8 | 1.8 | 0.8 | 17.1 | 0.3 | 2.6 | 44.6 | 0.7 | 7.0 |
| Cabbage | % | 0 | 1.6 | 3.7 | 0.5 | 1.0 | 4.3 | 1.6 | | 0.5 | 0.9 | 4.9 | 7.7 | 3.8 | 0.8 | 2.5 | 24.8 | 0.8 | 2.0 | 0.3 | 8.9 | 1.9 | 15.1 | | 2.2 | 10.6 | 1.3 | 4.7 |
| Garlic | % | 4.6 | 2.8 | 7.2 | 1.6 | 0.5 | 3.5 | 1.3 | 3.7 | 0.5 | 2.7 | 6.3 | 18.6 | 2.1 | 1.5 | 25.1 | 4.2 | 1.6 | | 0.3 | 6.9 | | 14.7 | 1.7 | 1.1 | 6.7 | 2.3 | 1.8 |
| Onion | % | 3.3 | 2.6 | 5.6 | 2.6 | 1.5 | 5.0 | 1.3 | 0.9 | 1.0 | 2.7 | 3.2 | 6.0 | 4.2 | 0.8 | 9.1 | 1.4 | 1.6 | 0.4 | | 4.6 | | 7.3 | | | 1.9 | 5.9 | 4.1 |
| Chili | % | 15.1 | 27.9 | 42.1 | 17.6 | 30.6 | 59.6 | 11.5 | 6.8 | 21.1 | 37.8 | 16.3 | 33.3 | 7.6 | 8.9 | 38.4 | 20.1 | 5.9 | 1.6 | 0.6 | 26.4 | 4.2 | 28.2 | 5.4 | 2.2 | 7.1 | 16.3 | 56.1 |

Source: Population households: Dzongkhag
Others: RNR Statistics 2000

# Table III-3 Vegetable and Spice Crops in the Study Area (2/2)

| | Unit | National | Lhuntse Dzongkhag: Lhuntse Dzongkhag | L1 Gangzur | L2 Jaray | L3 Khoma | L4 Kurtoe | L5 Menbi | L6 Metsho | L7 Minjay | L8 Tsenkhar |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **4. Quantities Sold of Vegetable and Spice** | | | | | | | | | | | |
| Potato | | | | | | | | | | | |
| Quantity Sold | ton | 21,069 | 18 | 7 | 1 | 0 | 0 | 5 | * | * | 0 |
| Percent Sold | % | 60 | 5 | 9 | 1 | 0 | 1 | 11 | * | * | 1 |
| Chili | | | | | | | | | | | |
| Quantity Sold | ton | 926 | 3 | 1 | 0 | 0 | 0 | 0 | * | 0 | 0 |
| Percent Sold | % | 33 | 2 | 5 | 3 | 0 | 0 | 2 | * | | 1 |
| Radish | | | | | | | | | | | |
| Quantity Sold | ton | 444 | 1 | 1 | 0 | * | * | 0 | * | * | 0 |
| Percent Sold | % | 13 | 2 | 8 | 2 | * | * | | * | * | |
| Sag | | | | | | | | | | | |
| Quantity Sold | ton | 0 | 0 | * | 0 | * | * | 0 | * | | * |
| Percent Sold | % | 0 | 3 | * | | * | * | 3 | * | | * |
| Ginger | | | | | | | | | | | |
| Quantity Sold | ton | 448 | * | * | | | | | * | | * |
| Percent Sold | % | 35 | * | * | | | | | * | | * |
| Cardamom | | | | | | | | | | | |
| Quantity Sold | ton | 482 | | | | | | | | | |
| Percent Sold | % | 95 | | | | | | | | | |
| Vegetable and Spice Total | | | | | | | | | | | |
| Quantity Sold | ton | 23,370 | 22 | 9 | 1 | 0 | 0 | 5 | 0 | 0 | 1 |
| Percent Sold | % | 47 | 3 | 8 | 1 | 0 | 1 | 7 | 0 | 0 | 1 |
| **5. Percentage of Farm Households Applying Farm Yard Manure and Chemical Fertilizers** | | | | | | | | | | | |
| Potato | | | | | | | | | | | |
| FYM | % | 49 | 15 | 5 | 43 | 26 | | 12 | 25 | 14 | 35 |
| Chemical Fertilizers | % | 35 | 3 | | 5 | 4 | | | | | 15 |
| Chili | | | | | | | | | | | |
| FYM | % | 26 | 15 | 3 | 32 | 22 | | 5 | 5 | 35 | 25 |
| Chemical Fertilizers | % | 7 | 6 | 1 | 7 | 9 | | | 11 | 2 | 16 |

| | Unit | Mongar Dzongkhag: Mongar Dzongkhag | M1 Balam | M2 Chali | M3 Chaskhar | M4 Drametse | M5 Drepong | M6 Gongdue | M7 Jurme | M8 Kengkhar | M9 Mongar | M10 Ngatshang | M11 Saleng | M12 Senmuhan | M13 Silambi | M14 Thangrong | M15 Tsakaling | M16 Tsamang |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **4. Quantities Sold of Vegetable and Spice** | | | | | | | | | | | | | | | | | | |
| Potato | | | | | | | | | | | | | | | | | | |
| Quantity Sold | ton | 981 | 153 | * | 4 | 553 | 25 | 1 | 0 | 7 | 158 | 6 | 47 | 3 | * | 0 | * | 15 |
| Percent Sold | % | 46 | 57 | * | 7 | 63 | 32 | 46 | 0 | 6 | 45 | 17 | 50 | 9 | * | 0 | * | 25 |
| Chili | | | | | | | | | | | | | | | | | | |
| Quantity Sold | ton | 24 | 1 | * | * | 5 | * | * | * | * | 9 | * | 2 | 0 | * | * | 1 | 2 |
| Percent Sold | % | 15 | 9 | * | * | 12 | * | * | * | * | 30 | * | 27 | 5 | * | * | 16 | 8 |
| Radish | | | | | | | | | | | | | | | | | | |
| Quantity Sold | ton | 57 | * | * | * | 7 | 9 | * | * | * | 30 | * | 4 | * | * | 0 | * | 1 |
| Percent Sold | % | 17 | * | * | * | 20 | 20 | * | * | * | 27 | * | 16 | * | * | 0 | * | 12 |
| Sag | | | | | | | | | | | | | | | | | | |
| Quantity Sold | ton | 13 | * | 0 | * | 0 | * | 0 | * | 0 | 8 | 0 | 2 | * | | 0 | * | * |
| Percent Sold | % | 30 | * | 30 | * | 13 | * | 30 | * | 30 | 39 | 30 | 25 | * | | | * | * |
| Ginger | | | | | | | | | | | | | | | | | | |
| Quantity Sold | ton | 2 | * | * | | * | | | * | * | * | * | * | * | | | | * |
| Percent Sold | % | 22 | * | * | | * | | | * | * | * | * | * | * | | | | * |
| Cardamom | | | | | | | | | | | | | | | | | | |
| Quantity Sold | ton | 0 | | | | | | | | | * | | | | | | | * |
| Percent Sold | % | 4 | | | | | | | | | * | | | | | | | * |
| Vegetable and Spice Total | | | | | | | | | | | | | | | | | | |
| Quantity Sold | ton | 1,076 | 155 | 0 | 4 | 564 | 34 | 1 | 0 | 7 | 205 | 6 | 55 | 3 | 0 | 0 | 1 | 18 |
| Percent Sold | % | 33 | 50 | 1 | 6 | 54 | 22 | 2 | 0 | 5 | 37 | 10 | 35 | 6 | 0 | 0 | 4 | 4 |
| **5. Percentage of Farm Households Applying Farm Yard Manure and Chemical Fertilizers** | | | | | | | | | | | | | | | | | | |
| Potato | | | | | | | | | | | | | | | | | | |
| FYM | % | 35 | 59 | 24 | 27 | 38 | 36 | | 14 | 16 | 44 | 39 | 26 | 21 | | 16 | | 15 |
| Chemical Fertilizers | % | 5 | 4 | 5 | 2 | 9 | | | | | 6 | 14 | 1 | 3 | | 8 | | 1 |
| Chili | | | | | | | | | | | | | | | | | | |
| FYM | % | 17 | 20 | | 3 | 23 | 20 | | | | 23 | 18 | 23 | 13 | | | 6 | 13 |
| Chemical Fertilizers | % | 7 | 2 | 6 | 3 | 16 | | | | | 9 | | | 6 | | | 12 | 2 |

Source: Population households: Dzongkhag
Others: RNR Statistics 2000

## Table III-4 List of Fruits and Vegetables at Weekly Market in Thimphu

(20 and 21,April 2002)

| Category | Species | Cultivar; Place of Production | Size; Weight; Appearance; Quality; Price; etc. |
|---|---|---|---|
| Temperate Fruits | Apple | Starking, Delicious; Bhutan | SS; 50～60 g; very small; good flavor, fresh and soft |
| | | Delicious; Bhutan | SS; 50 g; bruise; rotted, poor; 25 Nu./ kg |
| | | Delicious; India | M; 100 g; low quality; 50 Nu./ kg |
| | | Red Delicious; US, Washington | M; 150 g, fine; medium quality; 120 Nu. / kg |
| | Grape | green-white, seedless cvs.; India | Cluster M; 200g; small berry, 3～4 g; seedless, sweet; good quality |
| | Pomegranate | 2 types; India | L; 200 g; red and white; fresh also red and white |
| Subtropical and Citrus Fruits | Mandarin | Ponkan; India | M; 100 g; disease and bruise; acid-less, good quality; 500 Nu./ kg |
| | | Unknown cvs., Ponkan?; Bhutan | SS; 30～40 g; very small, medium quality; 25 Nu./ kg |
| | Lime | Lime | S; 40 g, round, good flavor |
| Tropical Fruits | Banana | | S; short |
| | Guava | | S |
| | Mango | | M |
| | Papaya | | S - L |
| | Pineapple | | S |
| Nuts | Walnut | Several types | M; sharp point tip - round |
| Dry Fruits | Apricot | | S; poor; appearance |
| | Persimmon | | Sliced and dried with peel |
| Fruit Vegetables | Water melon | Indian cv.; Bhutan | M; 2 kg; green, round, good quality |
| | Cucumber | | LL; 500 g; semi-matured, medium quality |
| | Oriental Pickling melon | | M – LL; 200 g - 2 kg |
| | Balsam pear | | S; 100 – 200 g; green; good quality |
| | Chayote | | M; 300 – 400 g |
| | Sponge gourd | | M～L; un-matured & matured, fiber |
| | Eggplant | | SS; 30 – 40 g; young, slender |
| | Tomato | | S; 50 g, good color |
| | Kidney bean | | M |
| | Green pea | | L; with and without pod |
| | Red Pepper | Some cultivars | SS – LL; red – green; slender - thick |
| Leaf, Stem, and Flower Vegetables | Cabbage | | S; 250 g; good formed head |
| | Cauliflower | | L; discolor on the second day |
| | Rape | | |
| | Nupus spp. | Some species | Young shoots |
| | Lettuce | | S; Non-head formation; green |
| | Welish onion | | S – M; slender |
| | Leek | | M |
| | Asparagus | | S; slender, short, green; good quality |
| | Fern | Young shoot of flowering fern | L; blackish; good quality |
| | Coriander | | |
| | Herbs | Some species | Young shoots |
| Root Vegetables | Potato | | M – L; red brown, good quality |
| | Onion | | S; red, conical |
| | Garlic | | M |
| | Radish | Some cultivars | S – LL; poor – excellent quality |
| | Carrot | | SS; slender, short, flesh and hard |
| | Ginger | | L blackish, fine |

## Table III-5 List of Fruits and Vegetables at Weekly Market in Mongar (1/2)

(4 & 10 May 2002)

| Category | Species | Cultivar; Place of Production | Size; Weight; Appearance; Quality; Price; etc. |
|---|---|---|---|
| Fruit Vegetables | Eggplant | Round cv. | M; 200 g; purple and green |
| | | Long cv. | M; 100 g, 30 cm; purple and green |
| | Tomato | | S; 40 – 50 g; shape and poor color |
| | Cucumber | | LL; 700 g; green, yellow stripe |
| | Chayote (Hayato-uri) | | M; 350 g, |
| | Balsam Pear (Niga-uri) | | S; 150 g; good quality |
| | Kidney bean | | M; 20 cm; yellowish color |
| | | Long cv. | L; 40 cm; green |
| | Chili | | S – L; 5 – 20 g; green |
| Leaf Vegetables | Lettuce | Non-bulb | S; green, excellent quality |
| | Cabbage | | SS; 200 g, |
| | Leek | | M; 40 cm; slender, with little bulb |
| Root Vegetables | Onion | | S – M; 50 – 100g; Red purple |
| | Potato | | SS; 25 – 30g; reddish brown |
| | | | M; 50g; light brown |
| Fruits | Banana | Local | M; bunch 1kg, finger 150g; short |

(12, 19 & 26 October 2002)

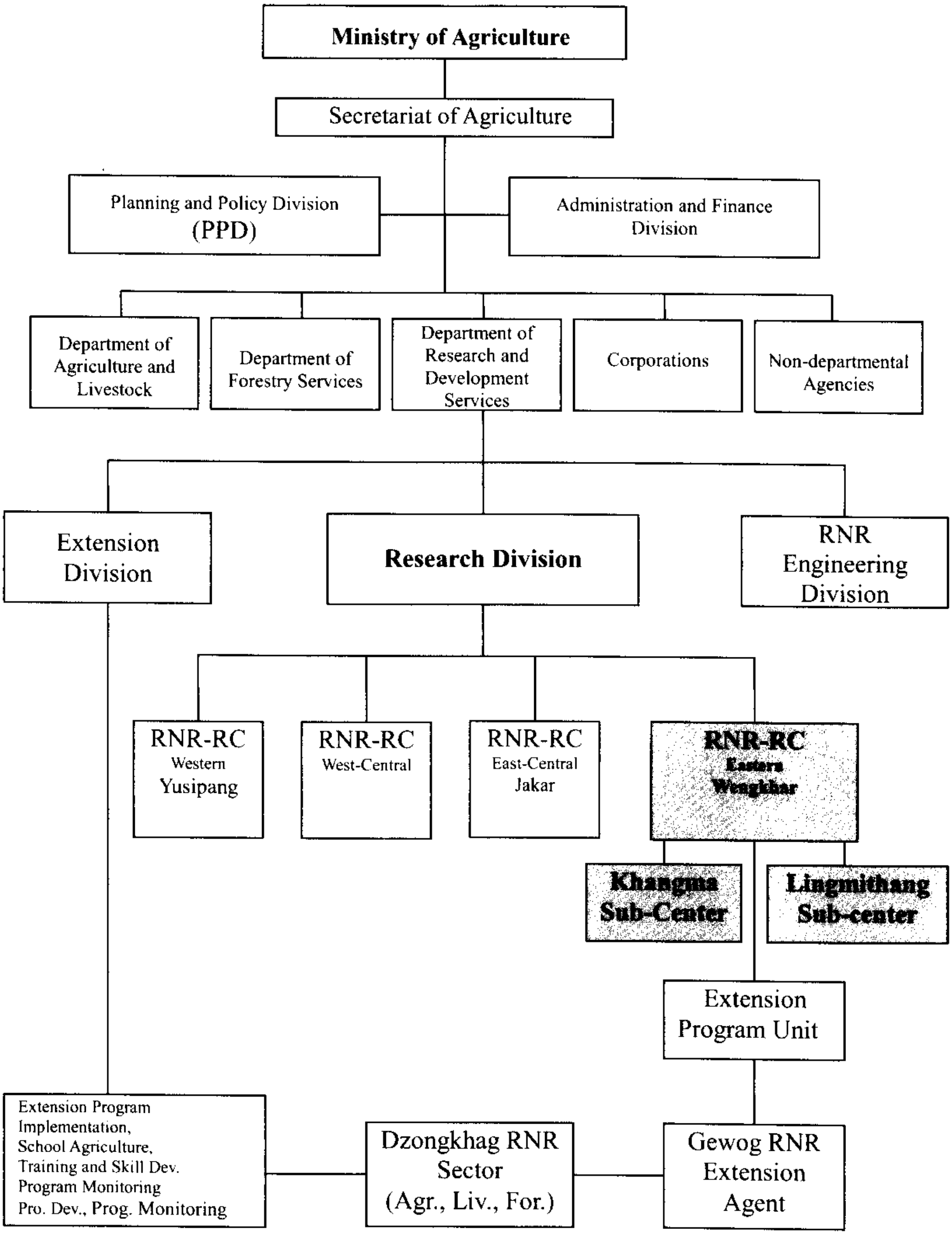
| Category | Species | Cultivar; Place of Production | Size; Weight; Appearance; Quality; Price; etc. |
|---|---|---|---|
| Apple | Delicious | Thimphu | SS; 100 g; irregular and poor quality; good taste, sugar content high (13), slightly acid (pH ); seed content 1-2; 35 Nu./ kg |
| Pear | Wild spp. | Local | SSS; 30 g; flat, sweet, but astringent, sugar content high (13), slightly acid (pH); poor quality ; 20 Nu. /kg |
| Persimmon | Astringent variety | Local | L; 200-250 g; flat, orange color, astringent, possible to de-astringent, few and small seeds; good quality |
| Banana | Unknown | Local 1 | Bunch S, finger SS; short; medium sweet, low sticky, |
| | | Local 2 | M, L; 1,200 g; with seed, sweet, slightly astringent |
| | | India | M, M – L |
| Guava | Unknown | | SS; 50 g; round, conical, creamy white, sweet, good taste, flesh creamy white, many seeds, small, hard |
| Pineapple | Unknown | | S;1 kg; good appearance, 15 cm / fruit; good flavor, |
| Lemon | | | SS; green, very small |
| Mandarin | | | S; green, low sweet, medium acid |

## Table III-5 List of Fruits and Vegetables at Weekly Market in Mongar (2/2)

(12, 19 & 26 October 2002)

| Category | Species | Cultivar; Place of Production | Size; Weight; Appearance; Quality; Price; etc. |
|---|---|---|---|
| Fruit Vegetables | Cucumber | | LL; good quality, very large |
| | Pumpkin | | LL; cut, without seeds |
| | Chayote | | M; spine or smooth; yellow |
| | Eggplant | | SS – L; purple, light green |
| | Tomato | Common | S; small 50g; red, medium quality |
| | | Mini | SS; 10g |
| | Tamarind | | M |
| | Kidney bean (pod ) | | L |
| | Hana-mame | | LL; pink & brown |
| | Chinese yam seed | Unknown | LL; 2 - 3 cm |
| | (Mukago ) | Red | L; 10 cm, dry |
| | Corn | | M; white |
| Leaf Vegetables | Leaf mustard | | S; leaf with a little flowers |
| | Takana *(Brassica juncea)* | | L |
| | Cauliflower | | SS; very small |
| | Coriander | | M; bright green |
| | Cabbage | | S; 300g; slender, |
| Root Vegetables | Carrot | | SS; 25 g |
| | Radish ( Daikon ) | White | SS – L; slender, very small - large |
| | Ginger | | L; good quality |
| | Potato | Light, brown, red | S – L; excellent quality |
| Mushroom | Hiratake *( Pleurotus ostreatus )* | Wild | LL; good quality |
| | Maitake | Wild | S |
| Miscellaneous | Sugarcane | | L; 80 cm, thick |

# *Figures*




| The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan | Figure III-1<br><br>Organizational Structure of MOA and RNR Sector |
|---|---|
| Japan International Cooperation Agency (JICA) | |

# *ANNEX-IV*

# *MARKETING AND POST-HARVEST PROCESSING*

**ANNEX-IV**

**Marketing and Agro-processing**

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# ANNEX-IV

# MARKETING AND AGRO-PROCESSING

## Chapter IV-1 THE STUDY AREA

Marketing of farm products reflects the subsistence nature of the production system. Most households produce crops and livestock for household consumption, and surpluses entering the formal and informal marketing systems are small and limited in each area. There is an increasing trend towards producing cash crop such as fruits, vegetables and pulses in response to; construction of roads into remote areas; establishment of weekly markets; and access to market. Back-yard fruit and vegetable surpluses are mainly sold at the roadside or on the weekly market. The auction yard in Samdrup Jongkhar, operated by the Food Corporation of Bhutan (FCB), handled a wide range of vegetables and fruits of 9,500 tons or Nu. 50 million in 2001. Among them, the commodities from the Study Area share 734 tons (8%) or Nu. 4 million (8%). Products are collected at the roadside and the weekly market and transported by truck to Samdrup Jongkhar for daily auction. Losses, however, occur, and the quality is substandard due to poor harvesting, rough handling, unsuitable packing, lack of grading standards, and the affects of rain.

In addition, there are also small-scale cottage activities carried out at home, such as weaving, and cheese and butter making for cash income.

### IV-1.1 Marketing

The East-West Highway runs through the four Gewogs in the middle of Mongar Dzongkhag, and Lhuntse Town is connected via the Dzongkhag road. Even having feeder roads, nearly half of Gewogs in the Study Area are inaccessible to cars; and horses and mules are the main means of transportation. The typical walking time from farm to road head is about 2-3 hours, although for more remote Gewogs it may be three days; and a one-day walk is common[1].

Lack of roads and market outlets constrain farmers from producing more than required for their own consumption. Therefore, the farmers' motivation is focused on their self-sufficiency more than on marketing of their products. The products are likely to be sold within the village first, mainly in bartering manner. Such conditions are also applied to agro-processing activities that are only operated on a family basis.

Under such circumstances, only farmers who live near roads or towns may be motivated to produce and sell cash crops to a market. It was known in the RRA Study that almost all the farmers in the village[2] by even two hours walk to the Dzongkhag road produce only for self-consumption.

(1) Marketing

The marketing condition in the Study Area is summarized below:

1 ARN Statistics 2000

2 Khoma Village, Khoma Gewog, Lhuntse District

1) Small capacity of local markets

The majority of households in the Study Area consists of farmers, and local consumers are very limited to officials, teachers, monks, canteens in the hospital and the school, and temporary workers of projects, such as road constructions. Therefore, the capacity of the local market is very small. It is judged that the distribution of local products between a farmer and a farmer, a farmer and a consumer, a farmer and a shopkeeper, and a shopkeeper to a consumer is almost enclosed in the area around a market and/or town shops, separated by the geographical and socio-economical condition. It can be said that the outlets of the marketable products from the Study Area are only for export via Samdrup Jongkhar.

2) Non-existence of a market economy

With the exception of farmers who live close to town - by the distance up to 2-3 hours on foot and are used to come to a market and/or town shops for selling their products - the great majority of farmers seems to come down to a town only when they need cash and/or daily goods.

Under such circumstances, the pricing condition by farmers is not flexible and determined roughly by every Nu. 5 but not by every Nu. 1. The price, therefore, seems to be less affected by the balance between supply and demand, and the price is not significantly different among markets. Such a local market price is not linked to the export market price at the Auction Yard in Samdrup Jongkhar, but it is usually higher (Fig. IV-1).

3) Lack of market information

Farmers do not listen to the broadcasting program of market information because it does not cover the regional market price information. On the other hand, middlemen engaging in trading of export products listen to the information concerning the auction yard in Samdrup Jongkhar.

4) Poor market infrastructure

Telecommunication is a very important marketing infrastructure together with the road network. A nation-wide telecommunication system has been established and started recently but it covers only major cities and towns. Many Gewogs cannot enjoy the benefits, and even local government officials in remote areas do not have effective means of communication with the outside.

5) Limited middlemen's activities

Middlemen, generally farmers and shopkeepers, are found to play a significant role in the marketing process, especially for the export commodity, mostly for potatoes, in the Study Area. Such activities are seen in the very limited area in the east of Mongar along the East-West Highway. Middlemen go to neighboring villages and weekly markets to purchase products even though the area they can cover is very limited almost within their Gewog, due to the poor road network. They commonly purchase by bartering. Some shopkeepers in Drametse Gewog said that only one third of purchased potatoes was paid in cash in 2001.

The potato production and marketing provide an important source of income for farmers and middlemen in surplus-potato production areas. The surplus potatoes are mainly exported to India via Samdrup Jongkhar. Therefore, the farm gate price in the shipping area is relatively lower and affected by the price at the auction yard in Samdrup Jongkhar. However, the market price in other areas is not linked to the price in Samdrup Jongkhar.

The prosperous area for exporting products is mainly to the east of Mongar in the Study Area.

(2) Market

There are five markets in the Study Area, all in Mongar Dzongkhag, while the first market in Lhuntse Dzongkhag will be constructed at Lhuntse town in 2003, after adjustment to the town planning by the Municipality Office. The four markets except the Mongar market were constructed in1999 by the assistance of the IHDP.

**Location and Condition of Markets**

| Location | Open Day | Platform | |
|---|---|---|---|
| | | With roof | Without roof |
| Mongar | Saturday | 2 | 1 |
| Lingmithang | Saturday | 1 | - |
| Gyelposhing | Sunday | 1 | - |
| Drametse | Sunday | 1 | - |
| Yadi | Friday | 2 | - |

The outline of the survey in each market is as follows:

- The market facilities belong to the Gewog office. Any seller can use the place in the market free of charge.
- Though it was officially decided to open the market once a week it can be seen that some farmers come and sell the products on the other days even though the number of buyers are small. General goods peddlers are used to sell on platforms in the Mongar market during daytime.
- The market usually finishes operation before 9 a.m., after starting at 6 a.m.
- The walking-distance to the market for farmers is mostly less than three hours.
- The participation number of farmers fluctuates by season. In Lingmithang, the number of farmers coming to the market is very few from April to June because the farming activities keep them very busy.

**No. of Sellers (Farmers)**

| Market | More | | Less | |
|---|---|---|---|---|
| | No. | Period | No. | Period |
| Mongar | 80 | | 30 | |
| Lingmithang | 15-20 | Dec.-Feb. | 0-5 | Apr.-Jun. |
| Gyelposhing | 50-60 | Jun.-Oct. | 10-20 | Feb.-May |
| Drametse | 40 | Jun.-Oct. | 20 | |
| Yadi* | - | - | - | - |

Source: Interview survey to EAs and farmers (sellers)
Note: * No operation because there are no consumers since the construction workers for schools and other offices left.

- Almost all farmers come to a market on foot and carry a basket or a sack on their backs. Therefore, their selling unit is small.


Mongar Market


Gyelposhing Market

Commercial linkage between markets has not been established yet because of small marketing units, small market capacities, and high transportation costs. It means that each market is operated autonomously in/around the area, and the fluctuation of the number of temporary workers in the area gives serious impact to the trading capacity of a market because the original market size is very small. The free market system covering the Study Area, that is attractive for middlemen and traders, has not been established yet. Hence, each local market also operates the self-sufficient condition within the covering area, just as each farmer in the area.

The sellers (farmers) are generally very strict with price-negotiations. It can be seen that they do not discount to a bulk buyer, and even when it is anticipated that some part of product will not be sold out. The price of the products seems to be little affected by the balance of supply and demand in the market. Only in the Drametse market, the price of products is linked to the price of the auction market in Samdrup Jongkhar because the middlemen in the area purchase, transport, and sell the products, mainly potatoes.

Generally, farmers sell their unsold products to town shops near the market. In Gyelposhing, it was observed that farmers sell the unsold products by visiting sales to ordinary residences in the town.

Major products sold at markets are vegetables and fruits, and sometimes cheese and butter, eggs, and meat as pork and beef. However, general grain, such as rice and maize, are not sold on markets. Imported rice, other imported products, and some local products, which can be stored, such as potatoes and onions, are sold in town shops.

(3) The Auction Yard in Samdrup Jongkhar

Samdrup Jongkhar is the only outlet for export products in the Study Area. Since the capacity of local markets is small and limited, the foreign market, especially the Indian market via Samdrup Jongkhar, is judged to be the only potential outlet for increased cash crop production of the Study Area even in the future. The auction yard in Samdrup Jongkhar is operated by the FCB throughout the year and almost all products of the Study Area transported there are sold to Indian buyers in this auction yard.


Potato Auction in Phuentsholing

The FCB auctions the products carried into by sellers as middlemen who are usually farmers or shopkeepers in the production area. The buyers in the auction yard are all Indian traders. The number of sellers participating in the auction in Samdrup Jongkhar is 30 to 40 in peak seasons and 10 to 15 in lean seasons, while that of buyers is 10 to 12 for potatoes and 20 to 25 for oranges. The FCB collects a commission that is 3% of the trading amount each, both from the seller and the buyer. The FCB actually pays the auctioned price deducted 3% to a seller after receiving of the trading amount together with 3% commission from a buyer.

The FCB operates five permanent auction yards including Samdrup Jongkhar, two temporary auction yards, and some mobile auction yards for supporting the marketing activities of farmers. The share of the auction yard in Samdrup Jongkhar among all auction activities is around one fourth (25%), followed by Phuentsholing whose share is more than 60% in trading value. The breakdown is shown in the table below:


Carrot Auction in Phuentsholing

**Trading Quantity, Value and Share of Each Auction Yard (2001)**

| Place | Q'ty (kg) | % | Value (N.) | % |
|---|---|---|---|---|
| Phuentsholing | 21,223,322 | 64.3 | 138,741,194 | 68.5 |
| Samtse | 637,206 | 1.9 | 4,393,200 | 2.2 |
| Gelephu | 237,610 | 0.7 | 1,642,211 | 0.8 |
| **S/Jongkhar** | **9,513,012** | **28.8** | **51,566,268** | **25.4** |
| Sarpang | 162,342 | 0.5 | 1,131,359 | 0.6 |
| Nanglam | 1,085,082 | 3.3 | 4,800,908 | 2.4 |
| Bhangtar | 89,135 | 0.3 | 373,753 | 0.2 |
| Toorsa | 37,825 | 0.1 | 39,400 | 0.0 |
| Total | 32,985,534 | | 202,688,294 | |

Source: FCB

The trading quantity of major products in the auction yard of Samdrup Jongkhar and the product quantity from the Study Area among them are compiled in the following table. It shows that dry chili, Rajma beans, soybeans, and squash are traded only in Samdrup Jongkhar among all auction yards. As for potatoes and oranges, the major export products, the auction yard in Samdrup Jongkhar shares about one fourth and a half respectively in the country. As for the products in the Study Area, the share of Rajma beans make up 30% and that of potatoes 11% in terms of quantities traded in Samdrup Jongkhar. The shares of other products are minor of below 7%.

**Quantity of Major Products traded in Auction Yard(s) in 2001**

| Product | All country | **Samdrup Jongkhar** | Share (%) | **Mongar/Lhuntse*** | Share (%) |
|---|---|---|---|---|---|
| | Kg (a) | Kg (b) | (b/a) | Kg (c) | (c/b) |
| Potato | 26,452,504 | 6,198,125 | 23.4 | 697,269 | 11.2 |
| Orange | 6,544,782 | 3,014,858 | 46.1 | 19,199 | 0.6 |
| Chili | 95,266 | 5,300 | 5.6 | 113 | 2.1 |
| Dry Chili | 4,412 | 4,412 | 100.0 | 117 | 2.7 |
| Rajma | 21,015 | 21,015 | 100.0 | 6,368 | 30.3 |
| Soybean | 169,092 | 169,092 | 100.0 | 10,259 | 6.1 |
| Radish | 187,439 | 51,988 | 27.7 | 190 | 0.4 |
| Squash | 20,183 | 20,038 | 99.3 | 384 | 1.9 |
| Vegetables | 1,654,190 | 98,000 | 5.9 | - | |

Note: * The products in Mongar or Lhuntse Dzongkhags traded at Auction Yard in Samdrup Jongkhar.
Source: FCB

The products from six Dzongkhags in the eastern region of Bhutan are auctioned only in Samdrup Jongkhar. The products of Trashigang made up a share of almost 50% and those of Samdrup Jongkhar followed with 25% at the Samdrup Jongkhar auction yard in 2001. The products of Mongar and Lhuntse, the Study Area, made up only 8%, among which the products from Lhuntse were not worth mentioning. It is considered that Mongar and Lhuntse together with Trashiyantse, sharing only 15%, have not been well developed for export oriented production and marketing. The reason is that these Dzongkhags are geographically far away from Samdrup Jongkhar, compared with the location of the other three Dzongkhags. The higher transportation costs may hold back the farmers from shipping their products to Samdrup Jongkhar.

**Share of Origins among Products Auctioned in Samdrup Jongkhar**

| Dzongkhag | Q'ty (kg) | % | Value (N.) | % |
|---|---|---|---|---|
| Pemagatsel | 1,166,707 | 12.3 | 5,965,811 | 11.6 |
| Lhuntse | 673 | 0.0 | 15,418 | 0.0 |
| Mongar | 733,436 | 7.7 | 4,247,835 | 8.2 |
| S/Jongkhar | 2,405,218 | 25.3 | 11,582,716 | 22.5 |
| Trashigang | 4,634,846 | 48.7 | 25,984,228 | 50.4 |
| Trashiyantse | 572,132 | 6.0 | 3,770,259 | 7.3 |
| Total | 9,513,012 | | 51,566,268 | |

Source: FCB

(4) Transportation

As mentioned before, the farmers in the Study Area sell or barter their products to neighbors, town shops, and consumers in the market. The farmers bring their products either on foot or by horse.

**Transportation by A Family (Drepong)**

**Transportation by Horse (Lhuntse)**

By contrast, the export products, mainly potatoes, are collected by farmers and shopkeepers and transported by truck to Samdrup Jongkhar, even though the area is mostly limited to the eastern area from Mongar town along the east-west highway centering Drametse Gewog. There are about eight transporters with one to two trucks each in Mongar town. They are facing difficulties to find out any local commodities including the agricultural products going out from the Study Area. So their trucks go out of this area without loading. Therefore, their business is mainly carried out for and relies on transportation of imported commodities from Samdrup Jongkhar and/or Phuentsholing to this area. In the potato-harvesting season, some trucks pick up the sacks of potatoes by requests of middlemen, as farmers or shopkeepers, at the area from Drametse to Kanglung in Trashigang Dzongkhag on the way to Samdrup Jongkhar. The transportation rate from Samdrup Jongkhar to Mongar is Nu. 8,000 to Nu. 11,000 per truck (Max. load is 8 tons) including the driver's charge and fuel. Since they are facing uneconomical conditions on the way to Samdrup Jongkhar, as described before, the rate of transportation charge to Samdrup Jongkhar is possively discounted by negotiation.

Other information about the transportation rate collected in Samdrup Jongkhar is as follows:

**Transportation Rate of Truck (8 tons) from Various Places to Samdrup Jongkhar**

| From | Nu. / Sack (50kg) | Nu. / truck (8 tons) |
|---|---|---|
| Pemagatshel | 15 | 2,400 |
| Trashigang | 25 | 4,000 |
| Tashiyangtse | 40 | 6,400 |
| Mongar | 40 | 6,400 |
| Lhuntse | 50 | 8,000 |

* Including driver's charge and fuel.

Looking at the figures in the table above, it can be recognized that the products in the Study Area are facing a comparative disadvantage to the products in the other Dzongkhags in the eastern region in view of the transportation cost.

**Unloading Used by Hook At Auction Yard**

Regarding the quality of agricultural products transported by truck, it is found that serious damage occurs during transportation and unloading, because the transportation charge is paid by sack base and not by weight base. In order to reduce the charge, it is stuffed into one sack as much as possible, and this method is applied to almost all products including leaf vegetables, such as cabbage. The weight of such a full stuffed sack often reaches 100 kg making it a difficult handling weight for a laborer, hooks are used for unloading, and rough handling is common at the auction yard. Lack of numbers of scales and the absence of any authorized inspection agency for scales are the constraints to solve this problem.

**Full Stuffed Sucks of Potato**

## IV-1.2 Agro-processing

There is no special processing adopted after harvesting of the products other than cheese and butter production from milk and alcoholic drink production from grains, mainly maize. As for animals such as cows, pigs, and chicken, Bhutanese do not kill them traditionally due to religious sentiment, therefore marketing of meat is very limited. It seems that meat is mainly distributed within a village and/or among households. There are no factories that can be called "industry" in the Area. Traditional food processing operated by the family, however, is widely seen over the Study Area.

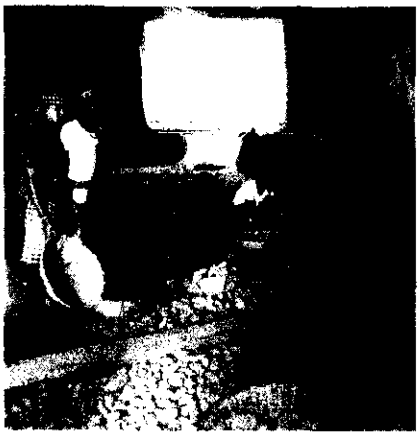
### (1) Post-harvest Processing

The farmers harvest paddy by hand and spread out the panicles on the field for drying. The drying period differs from one to three days by the altitude and climate condition. Hand threshing is the most common method in the Study Area. The farmers strike the bundles of panicles onto a stone board to separate paddy grains from the panicles. The threshed paddy grains fall from head height to the ground for separation of light impurities such as immature grains, dust, husks, and straws and are transported to the residence in sacks. The farmers follow almost the same way for processing of other grains. The maize is dried and stored by a cob hanging from a beam in the attic.

It is reported that post-harvest loss occurs on most products due to poor handling and storage. Post-harvest losses of maize and rice at the household level are substantial because fumigants for insect infestation are not used[3]. As for vegetables and fruits, loss generates remarkably by bruising, exposure, and spoilage due to poor harvesting, packing, and handling practice. There is no suitable equipment such as sorting tables, roller conveyers, and weighing machines for preserving the quality and loss reduction of products from harvesting to sales point, especially at the auction yard in Samdrup Jongkhar. Additionally, since grading and packing standards do not exist yet, the fair and effective pricing and smooth auction procedure are impeded, and serious losses occur on exported products such as potatoes and oranges during the transportation and handling procedure.

**Package of Cabbage**

**Carrot Grading after Auctioning**



**Potato Grading after Auctioning**

The Post-Harvest Unit of MOA in Paro is the sole organization in Bhutan for research & development in this field. However, their activities have just started recently and necessary extension programs for post-harvest practice improvement have not been realized yet.

(3) Agro-Processing

Households conserve surplus back-yard horticultural production by drying and pickling vegetables for winter consumption. Maize is ground and paddy is milled for cocking. Surplus maize is used to distill alcohol, and the residue is used for animal-feed. Meat is sun dried, smoked, or processed into sausages, and stored in the attic. The attic is also used for drying and storing of grains. Milk is churned into butter and cheese using traditional methods.

In the Study Area, only the Second Eastern Zone Agricultural Programme (SEZAP) and the Integrated Horticulture Development Project (IHDP) are providing training services to

[3] "Appraisal Report for SEZAP", IFAD, May 1999

farmers and farmers groups in a few villages. The training program covers the simple processing technologies of agricultural products, business management, accounting, and marketing, together with a credit program even though the capacity of the program is small. Such supporting activities should be expanded not only to farmers, but also to entrepreneurs.

Fundamental industries supplying various materials to agro-processing factories have not been developed well in Bhutan, none in the Study Area. These industries produce processing machinery and equipment, packaging materials, chemicals, other consumables, etc. used in the agro-processing industry. At present, the processors must use many imported machines, equipment and materials that are usually expensive and difficult to obtain. On the other hand, many imported agro-processing commodities, mainly from Indian, are sold in markets. Such conditions discourage the local agro-processing business in view of production costs.

Small processing activities have started as rice milling, maize grinding, and flaking and lemon grass oil distillation. The details of these activities are explained below.

<u>Rice milling and maize grinding</u>

**Rice Mill (left) and Maze Grinder**

Farmers usually and traditionally mill paddy by pounding in a mortar and grind maize by a millstone. Recently, small rice mills and maize grinding equipment have spread over the places with household concentrated areas. Such processors, usually farmers, render milling and grinding services to farm households in the surrounding area. However, it is reported that about 80% of farm households still process by the conventional way in the Study Area. Those equipment and machines made in India were supplied and sold by the AMC (Agricultural Machinery Center).

The specification of equipment observed around Mongar Town is as follows:

- Rice mill: Engerberg type, 50 - 60 kg /hr, Price Nu. 3,700.
- Maze grinder: Horizontal shaft, 80 kg/hr, Price Nu. 4,358.

The equipment is driven by a Chinese diesel engine or through PTO by a tractor. Their processing fee is 20kg of processed rice for a sack (80-90kg of paddy) or Nu. 50 for each kg of product.

The machinery is of an old type with low milling yield but of low cost and easy to operate. Since the quantity of rice and grains distributed in markets among all local production is negligible, the introduction or replacement of/to modern machines cannot be expected.

<u>Maize (Corn) flaking</u>

The AMC has developed and promoted propagation of the maize flaking machine. Similar to rice mills, a farmer who introduced this machine renders the processing service to neighboring farmers. The processing fee is 25% of the processed products.

Lemon grass oil production

Corn Flaking Machine

Lemon grass is a perennial grass, which grows naturally in association with Chair pine trees in the Study Area. The Essential Oils Development Programme (EODP) has been addressed in 1993. The EODP, under the Ministry of Trade and Industry, is the implementing agency of the UNDP funded by the IHDP's sub component of Medicinal & Aromatic Plants. The maximum production is about 18 tons / year in 1999 in east Bhutan, which Mongar Dzongkhag shares 9.5 tons and Lhuntse 0.7 tons. All essential oils were exported at Nu. 8,138,000.

Harvesting and distillation take place in the period between June and December, with the peak period in August to October. Approximately 1,000 people, mostly women, are involved in lemon grass harvesting, while about 130 individuals - men and women - own distillation units in the Study Area. Distillation unit owners are members of the village communities. Collectors either sell their produce to distillers or work as hired laborers for the distillers. The average income from distillation is at least Nu. 100 per day and from harvesting Nu. 2,637 / season. Fuel wood demand for distilling lemon grass is met from the thinly growing Chair pine trees in the lemon grass growing area. The supply cannot be relied upon in the long run at the current rate of felling, which is about 842 truckloads a year[4].

**No. of Distillation Unit and Employment Generated**

| Dzongkhag | No. of Distillation Unit | Employment Generated |
|---|---|---|
| **Mongar** | 97 | 824 |
| Trashigang | 30 | 248 |
| **Lhuntse** | 24 | 200 |
| Tashiyangtse | 19 | 160 |
| Total | 170 | 1,432 |

Source: EODP, MTI, Mongar

Lemon Grass is being quite intensively harvested, particularly in areas near to the sources of the water needed for distillation units. Spent lemon grass can be used a medium for mushroom growing and subsequently as fodder for cattle.

Pine resin collection

Pine resin collection was started by the private enterprise named Tashi Corporation in 1974. At present, the Corporation has two collection points at Kurizampa and Sherichu in Mongar Dzongkhag and one point at Autsho in Lhuntse Dzongkhag. The collected raw resin is transported to the factory in Samdrup Jongkhar and processed and purified. The products are exported to India.

Each collection point has contractors who collect resin from farmers around his place. The activity in case of the Serichu collection point is summarized below:

- There are ten contractors who distribute the collected resin in tin cans containing 15-16 kg per each can. They distribute them to the collection point by one to two times a month from April to December. From November to December is the peak

[4] "Appraisal Report of SEZAP" May, 1999

distribution period.

- The Corporation pays Nu.9 for every kg to contractors, which is divided to Nu.1 for supervising fees and the remaining Nu.8 for labor charge for collection except transportation charge from the collection area to the collection point.
- The Corporation also has to pay Nu.4 for each kg as the loyalty to the Forest Department.
- The collection point in Serichu collects about 2,500 tin cans, almost 40 tons of resin a year. As the result, almost Nu. 350,000 is paid to ten contractors. As a contractor operates about eight collectors, a collection laborer may receive nearly Nu. 4,000 / year.

### IV-1.3 Development Constraints

There are various constraints in the development for marketing and processing of agricultural products in the Study Area.

#### *IV-1.3.1 Marketing*

In the Study Area, it is very common that farmers barter their surplus products, the local market is very small and middlemen in the limited area are engaged in export commodities. Various constraints on the creation of dynamic marketing conditions suited to income increase of farmers are observed in the Study Area.

1) Very poor road network

Due to the geographical condition, the road network in the Study Area is very poor which is the biggest constraint standing in the way of development. Only limited numbers of farmer who live close to the road and to the town can access the market but the majority of farmers face the difficulties of market accessing.

2) Poor communication infrastructure

Telecommunication is a very important marketing infrastructure together with road network. A nation-wide telecommunication system covers only cities and towns on the district level. Many Gewogs cannot enjoy the benefits, and even local government officials in the remote area have no effective means of communication to the outside.

3) Low marketing motivation of farmers

Facing the physical constraints mentioned above, farmers' motivation on farming is centered on their self-sufficiency more than on marketing of their products. Such conditions are also applied to agro-processing activities.

4) Small capacity of local markets

Almost all inhabitants in the Study Area are farmers, and the local consumers for agricultural products are limited to inhabitants other than farmers. Then the capacity of local markets is very small. Such situation will not change even in the future as far as the Royal Government will continue to strengthen the self-sufficiency of agricultural production.

5) Not yet well-established free market system

It seems that the price is almost fixed and decided by the seller's offering. Commercial linkage between markets has not been established yet and each market is operated individually. Hence, the free market system covering the Study Area that is attractive for middlemen and traders has not been established yet.

6) Non-existence of grading and packing standards

Small products such as potatoes and oranges are collected and transported by middlemen and sold in the auction yard in Samdrup Jongkhar for export. Since the grading and packing standards do not exist yet, the fair and effective pricing and smooth auction procedure is impeded, and serious losses occur during the transportation and handling procedure.

7) Lack of scales and absence of inspection authority

Together with the constraints above, lack of scales and absence of inspection authority have kept the practice of a full stuffed sack for truck transportation of products so that serious losses occur during the transportation and handling procedure.

8) Requirements of farmers and traders not met by the Market Information Service

At present, the broadcasting service of market information does not cover regional information and is not used by farmers in the Study Area.

9) Not yet well-established group activities among farmers

There are some marketing activities that are being tried among small farmers groups by the SEZAP. There is, however, no group gathering and shipment activity yet. As the shipping unit of products by each farmer is very small, the shipping condition that is attractive for middlemen has not been established.

### *IV-1.3.2 Agro-processing*

There is no special processing adopted after harvesting of the products other than the traditional processing by the family. The constraints for development found in the field study are as follows.

(1) Grain post-harvest processing by farmers

In Bhutan, the assessment study for post-harvest loss on agricultural produce has not been carried out yet. However, it is reported that considerable losses generate in the post-harvest stage of products.

a) Technical extension service for this field has not started yet.

The Post-Harvest Unit in Paro is the sole organization in Bhutan for R & D in this field. However, their activities have just started recently and the extension program for post-harvest practice improvement has not been realized yet.

b) Incentives of loss reduction are low.

In most cases of the Study Area, farmers, as almost all inhabitants, carry out their style of living based on self-sufficiency and barter their surplus produce within the village and the neighboring area, because they are isolated from the market. Additionally, they have followed the traditional practice many years without the chance for learning improved post-harvest processing technology. Hence, incentives for farmers to improve post-harvest processing are still low.

(2) Rice mills and grinding mills

Rice mills and grind mills are recently spreading over the Study Area. All rice mills are Engerberg Type made in India, and grind mills for maize processing are also India made.

1) Only low quality machines exist and are spreading.

Considering the low density and poor condition of local roads in the Study Area such custom mills will spread out more to respond to households' needs. The machinery is of an old type with low milling yield but of low cost and easy to operate. However, the introduction of and replacement to modern machines cannot be expected unless commercial activities of a rice and grain processing industry will be created in future.

(3) Other agro-processing

In the Study Area, there are no factories that can be called "industry". There are only traditional small activities carried by the family. Therefore, various initial constraints, which may be common across districts, are recognized and considered in order to promote the development of the agro-processing industry in the Study Area. The constraints concerning general commercial environments such as transport and communication infrastructures are described in the section for marketing.

1) Limited technical extension service

In the Study Area, only the Second Eastern Zone Agricultural Programme (SEZAP) and the Integrated Horticulture Development Project (IHDP) are offering training services to farmers and farmers groups in a few villages. The training program covers simple processing technologies of agricultural products such as drying mushrooms together with the provision of a credit program even though the capacity of the program is very small.

2) Non-existence of supporting programs for marketing of local products

At present, the local processed products have not been well developed, and supporting programs for marketing them do not exist other than for lemon grass oil, assisted by the MTI. Under the free market economy, marketing is a prior activity for the agro-processing industry as well as agricultural production. Supporting programs for marketing of local products by the public sector is an important function to improve economic conditions of the Study Area through the development of industries.

3) Non-existence of fundamental industries

Fundamental industries supplying various materials to agro-processing factories have not been developed well in Bhutan, and none is in the Study Area. Such conditions place the local agro-processing products at disadvantage and make them less competitive compared to imported products in view of production cost.

# CHAPTER 2 DEVELOPMENT PROGRAM

## IV-2.1 Development Potentials

The followings are identified as potentials for the development of marketing and processing of agricultural products in the Study Area.

### *IV-2.1.1 Marketing*

To promote and ensure the income increase of farmers based on the appropriate free market system in the Study Area, various potentials exist as follows:

(1) Increasable marketing motivation of farmers

At present, almost all farmers are unfamiliar with the free market economy because of difficulties of market access and lack of knowledge. Improvement of market infrastructure such as road and communication network will expand the accessibility to markets for them. The motivation of marketing their produces can be increased.

(2) Needs of local transporters possible to be met by increase of marketable products

The local transporters are facing difficulties in finding out local commodities, which can be transported to Samdrup Jongkhar. Therefore, increasing marketable export products will have to have the transportation means without difficulties by force. So that they even contribute to the improvement of the economy of local transporters.

(3) Enough potential of international markets

Although it is anticipated that the capacity of the local market will not increase remarkably even in the future, the international market will still have big potentials in view of quantity and quality of products. The expected amount of export products in the Study Area is not big compared to the scale of foreign markets especially in India. Then, the small specific cluster of market will be potentially well developed without looking for major fields of international market with many competitors.

(4) Wide range of marketable resources

There is a wide range of diverse potential resources of marketing, especially to the international market, due to the specific geographical and climatic conditions. The range of resources that can suit the market needs, even niche markets, is wide.

(5) Reducible marketing costs

Marketing costs can be reduced after the improvement of the road network and the introduction of the grading and packing standards for products. Additionally, more competition that will generate among middlemen and traders once the free market system spreads over the Study Area will reduce the costs needed for marketing.

(6) Reducible losses

Losses can be reduced by popularizing scale use for transportation charge and by the introduction of the grading and packing standards for products, together with the extension of the post-harvest processing technology to farmers.

(7) Possibility to strengthen official support

Officials concerned have already recognized that the field of marketing is one of the most important fields for increase of farmers' income. Therefore, various agencies and sections, such as the AMS and the PHU in MOA and some sections in MOTI, have started to engage in the activities for the improvement of the present market condition. Institutional support systems and programs, such as standard and quality control of commodities, and export promotion will be strengthened more.

### *IV-2.1.2 Agro-processing*

(1) Post-harvest processing by farmers

a) Farmers can improve the post-harvest processing technology.

The PHU (Post-Harvest Unit) is the responsible and implementing organization for R & D activities concerning the improvement of post-harvest practice carried out by farmers. The results will be gradually released and extended to farmers through the existing agricultural extension system. Then, farmers can have the opportunity of learning improved post-harvest processing technologies.

b) Incentives of post-harvest processing improvements can be increased among farmers.

More farmers will access markets frequently and receive market concerned information easily once the road and information network improves. Hence they will raise awareness for losses and will have incentives to improve post-harvest processing of their products in view of their economy.

(2) Agro-processing

a) Traditional processing activities can be modernized.

There are presently various traditional processing activities in a family, such as making alcohol, butter and cheese, and weaving in the Study Area. These activities can be gradually modernized and merged to the local industry in view of an economic efficiency from the area where the market economy system, together with expansion of road and communication network, will be penetrated in.

b) The basis of technical extension and support services exists.

The PHU has also started R & D activities for various small-scale processing technologies such as drying and potato chip making. On the other hand, the MTI is promoting the fostering program of entrepreneurs even in regional areas. And some projects like the SEZAP and the IHDP also support the programs by certain group, product and place through investment, training, and marketing. Therefore, the technical extension and support services in this field will be more diversified and strengthened in the future.

c) The variety of raw material resources is enormous.

Various agricultural produces can be produced in the characteristic and diversified natural condition of the Study Area. The potentials of market exploitation for such characteristic natural raw materials, such as aromatic and medicinal plants, are high.

## IV-2.2 Zoning Plan for Marketing

The accessibility to the road is the most important condition for farmers' marketing activities of products. Presently, farmers in the Study Area do not face the same degrees of difficulties to gain access to the road due to different distances. A very limited number of farmers who live close to the road and the town can enjoy the marketing activities relatively well. The only outlet for export products in the Study Area is still Samdrup Jongkhar. The distance thereto is the important condition affecting the transportation costs and the sales motivation of farmers and middlemen even though they should live close to the road head. Actually, the attractive area for shipping of export products, mainly potatoes, is the eastern area from Mongar town along the East-West Highway and the shipping activities can be hardly seen in other areas.

There are no remarkable differences between the kind and condition of products produced among Gewogs, and such a tendency will continue even in the future. Therefore, the zoning is considered Gewog-wise and is made up by two parameters, one is the distance to Samdrup Jongkhar and the other is the condition of households by walking distance to the road head.

The order according to advantage with respect to accessibility to Samdrup Jongkhar and to roads of farmers as the result of zoning is as follows:

### *IV-2.2.1 Accessibility to Samdrup Jongkhar*

The order of Gewogs according to accessibility to Samdrup Jongkhar is considered and compared among Gewogs focusing on the relation to the East-West Highway leading to Samdrup Jongkhar. The result is shown in the table below:

**Accessibility of Samdrup Jongkhar**

| Order | Lhuntse Dzongkhag | | | | Mongar Dzongkhag | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | Drametse | Chaskhar | Ngatshang | Mongar | |
| 2 | Tsenkhar | Minjay | Menbi | | Saleng | Tsakaling | Chali | Drepong | |
| 3 | Jaray | Khoma | Metsho | Gangzur | Tsamang | Balam | Serimuhang | | |
| 4 | Kurtoe | | | | Gongdue | Silambi | Jurme | Kengkhar | Thangrong |

Note: 1: Gewogs have a motorable road (east from Mongar)
2: Gewogs have a motorable road (other than above)
3: Gewogs close to motorable road
4: The other Gewogs

### *IV-2.2.2 Marketability for Farmers*

For consideration, the data of "Percentage of Farm Households by Walking Distance to Motorable Road" in the Agricultural Census 2000 was used. In the data, the walking distance to the road head is classified and indicated by walking "hours". The percentage of households located in a walking-distance of less then an hour (<1) and less than three hours (<3) was compared among Gewogs. It is judged that the location of less than an hour (<1) has an advantageous condition and that three hours (=3) is the limit in view of practical daily transportation activities. The result is prepared in the table below:

**Accessibility to Motorable Road**

| Order | Lhuntse Dzongkhag | | | Mongar Dzongkhag | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| A | Menbi | | | Chaskhar | Mongar | Ngatshang | | | |
| B | Minjay | Tsenkhar | | Chali | Saleng | Tsakaling | Tsamang | | |
| C | Gangzur | Khoma | | Drametse | Drepong | | | | |
| D | Jaray | Kurtoe | Metsho | Gongdue | Jurme | Kengkhar | Serimuhang | Silambi | Thangrong |

Note: A: More than 50% in < 1 and 90% in total (<3).
B: More than 75% in total excepting A.
C: More than 50% in total excepting A and B.
D: Less than 50% in total.

### *IV-2.2.3 Total Evaluation*

The total evaluation was given from the above results by two parameters, and the advantageous order from high (1) to low (3) of Gewogs in view of marketing is classified in the following table:

**Evaluation Result (Lhuntse Dzongkhag)**

| | | | | | |
|---|---|---|---|---|---|
| 1 | Menbi | | | | |
| 2 | Minjay | Tsenkhar | | | |
| 3 | Gangzur | Jaray | Khoma | Kurtoe | Metsho |

**Evaluation Result (Mongar Dzongkhag)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | Chaskhar | Mongar | Ngatshang | | | | |
| 2 | Chali | Drametse | Drepong | Saleng | Tsakaling | Tsamang | |
| 3 | Balam | Gongdue | Jurme | Kengkhar | Serimuhang | Silambi | Thangrong |

## IV-2.3 Zoning of the Study Area

In addition to the zoning considered from the viewpoint of marketing above, the comprehensive zoning covering all study fields, not only marketing, was carried out for preparation of the framework for the Master Plan. The additional parameters of living standard, agro-ecological zones, food security, special crops, and land resources were added to the accessibility to export markets and the accessibility to roads for marketing, evaluated above. Based on those parameters, problems, development potential, and constraints were identified and development stages were recognized by Gewogs in the Study Area.

The results of the categorization on the development stage from low (1) to high (3) is shown in the table below:

**Development Stage and Gewogs**

| Stage | Gewogs |
|---|---|
| 1 | Jaray, Khoma, Kurtoe, Metsho (Lhuntse)<br>Drepong, Gongdue, Jurme, Kengkhar, Silambi, Thangrong (Mongar) |
| 2 | Gangzur, Minjay, Tsenkhar (Lhuntse),<br>Balam, Chali, Drametse, Saleng, Serimuhang, Tsakaling, Tsamang (Mongar) |
| 3 | Menbi (Lhuntse),<br>Chaskhar, Mongar, Ngatshang (Mongar) |

The development conditions of each stage are clarified as follows:

*Stage-1*: The main problem and target of "Stage-1" are basic human needs (BHN) and food security. Fulfillment of BHN and increase of food crop production will be the main issues for the development. In this Study, rural access improvement and increase of food crop production will be covered for the Gewogs of this Stage.

*Stage-2*: The main targets of "Stage-2" are stable food crop production and income generation by horticultural crop development. Improvement of productivity, reduction of losses, extension of improved technology on horticulture and farm road improvement will be the main project components for the Gewogs of this Stage.

*Stage-3*: Being located in advantageous locations with better access, the main targets of "Stage-3" are to add value to agricultural products and the development of a marketing system. Market oriented production will be promoted for the Gewogs of this Stage.

### IV-2.4 Direction of Development

Most agricultural production in the Study Area is still carried out for self-consumption and marketing activities of farmers are small and limited. Immediate problems remain to be solved to expand and improve agro-processing and marketing activities based on the increase of agricultural production. Considering the problems and the potentials clarified before, the direction for formulating the development program is described below.

#### *IV-2.4.1 Marketing*

(1) Creation of a free market system among local markets

The free market mechanism has not been well formulated yet in the Study Area. As for export crops, such as potatoes and oranges, farmers sell the products to middlemen at the roadside, town shops or markets (only observed in Drametse and surrounding areas), and the number of buyers that farmers can choose is limited. Additionally, the information that farmers can receive from neighbors and buyers is very limited. The Market Information Service of MOA should be strengthened for collection of additional regional information, and processing and dissemination of useful information to farmers in the Study Area. To give incentives to farmers to increase production and to provide more opportunities to farmers to meet better buyers, two effective measures have to be taken. One is the creation of the linkage between existing local markets. The other is the linkage to the auction market in Samdrup Jongkhar. Furthermore, such conditions will allow farmers to gain access to trade prices to learn about current market conditions. On the other hand, such a market condition makes middlemen to save time and work for collecting the products compared to the current condition which they collect from each farmer individually at various places.

(2) Fostering farmers group activities

Although farmers are generally in a disadvantageous position in selling their export products as mentioned before, they have very little marketing sense and make few efforts to improve their bargaining power, such as organizing a group for joint sales. In order to form the farmer's consciousness about the mechanism of a free market economy it is effective to foster farmers groups for various activities. Those activities are for example joint sales and processing of their products as well as water management, rural credit, procurement of agricultural inputs, etc. It would also help them for receiving support programs such as technology extension and market information in addition to strengthening their bargaining power.

(3) Creation of a market-oriented mind

It is not sure that the increase of surplus produce will generate income increase of farmers even after improvement of accessibility to the market. Occasionally, farmers may have trouble with unsold products and the slump in the market price because of over-supply. In the Study Area, the probability of such a risk exists since farmers tend to cultivate the same kind of products during the same cultivation period. Therefore, farmers must change their mind-set from the self-sufficient to the market-oriented basis. As a conclusion, the market-oriented mind-set is indispensable to ensure the sustainable increase of income in view of marketing. Applying this, farmers will watch and learn about the market conditions continuously and will then consider which kinds of crop, which shipping month and which destination market are most profitable. Such a mind-set will bring a farmer or farmers groups to find out the way for meeting the market needs and creation of the comparative advantage in market.

### *IV-2.4.2 Agro-processing*

(1) Improvement of post-harvest processing

In the Study Area, the post-harvest loss of products is reported as a serious condition. It is expected that the loss reduction will have a direct impact on the total quantity of products for self-consumption and sales. Since farming practices affect loss generation as much as post-harvest processing, it is advisable that improved post-harvest processing technologies shall be extended to farmers in the existing agricultural extension program. The extension program on post-harvest technologies, however, has not been established yet, and farmers are having difficulties in learning and accessing the appropriate technology. The extension program for post-harvest processing technologies will be established by the PHU and carried out in the agricultural extension system.

As for cash crops, especially vegetables, the losses and damage of products are not critical in local markets in the Study Area because the product units being transported are small and handled by farmers. However, it is reported that serious losses and damage are observed in the auction market in Samdrup Jongkhar due to bad packing and handling conditions in long distant transportation. Farmers and middlemen will have to improve the packaging and loading conditions. They will also have to introduce the transportation charge by weight in collaboration with transporters when they ship their products to distant markets. The grading and packing standards that are presently being considered by the AMS in the MOA will be one of the effective measures to reduce such losses.

(2) Strengthening support programs

Agro-processing industries have not started yet and are facing the initial stage of development in the Study Area. Therefore, the official institutional promotion programs for development must be established and strengthened, i.e. technical extension services, marketing support programs, and financial support programs.

The SEZAP is carrying out training services and financial support concerning small agro-processing businesses to farmers groups in a few villages in the Study Area, such as drying of mushrooms. The IHDP also supported and trained the farmers concerning the distillation method for lemon grass. Such kinds of supporting activities, focusing on bottom-up development activities by organizing farmers and entrepreneurs should be expanded.

### *IV-2.4.3 Basic Commercial Infrastructure*

Commercial environments supporting the marketing system, such as transportation infrastructure and communication infrastructure, are not well developed. The improvement of such a commercial environment is the foremost and basic requirement for an effective market system under a free market trading to and through India.

The fields concerning the above-mentioned commercial infrastructure shall be treated as external conditions in view of the study's scope of marketing and agro-processing fields. Important development activities in such fields are described in the following section.

### *IV-2.4.4 Unavoidable Inequity in Development*

For farm households in the Study Area, the development of the above-mentioned commercial infrastructure, especially the road network, has utmost priority and is indispensable for the improvement of the economic as well as the social condition. However, the expansion of the road and information network will proceed linearly and the degree of effects to households brought by it differs by the distance from the road and the telephone accessibility. As described in 2.2 "Zoning in the Study Area", the distance from the road head is the absolute important factor for generating disparity on accessibility to markets among farm households. Therefore, those households living far from the road will remain in the disadvantageous position of marketing even after the extension of the road network. Hence, the improvement of commercial infrastructure will relatively increase the number of households that can enjoy the accessibility to markets but will not provide equal benefits to all households.

As a conclusion, the development programs shown hereinafter cannot solve such problems of inequality. Therefore, special political measures to improve such unequal opportunity conditions shall be provided to those households standing the disadvantageous position of being located far form the commercial infrastructure.

### *IV-2.4.5 Development Direction by Areas*

Following the understanding of "Inequity in Development" mentioned above, some strategic directions for development can be considered among the area categorized by the degree of advantage or disadvantage for marketability. As mentioned before, farmers have to promote and to create the comparative advantage on various factors through their production and marketing activities, such as kinds and varieties of products, harvesting time, targeted markets, grading standards, and shipping condition including packaging and price. On the other hand, the Study Area is facing unavoidable disadvantages of a longer distance to Samdrup Jongkhar, compared to other Dzongkhags in the east region of Bhutan.

In consideration of the above conditions, the development direction by areas is classified as follows:

**Development Direction of Products by Area**

| Zone | Area | Development Direction |
|---|---|---|
| A | Gewogs have motorable roads and are located eastern area from Mongar | To compensate for high transportation costs to Samdrup Jongkhar with rationalizing the production and marketing costs focusing on the major export commodity. |
| B | Gewogs have motorable roads and are located beyond Mongar from Trashigang | To develop special profitable products at offset to high transportation costs for the international market, while following the same efforts of Stage-3. |
| C | Gewogs have not motorable roads | To develop special products of high added value and transportable、together with a sales market. |

### IV-2.5 Development Concept

Most agricultural production in the Study Area is still carried out for self-consumption and marketing activities of farmers are small and limited. Immediate problems remain to be solved to expand and improve marketing and agro-processing activities based on the increase of cash crop production.

Considering the constraints and the potentials clarified before, the expected conditions for the development are considered and abstracted in Fig. IV-2 and IV-3.

The development concept based on these figures is itemized as follows:

(1) Precondition

① The foreign market is expandable for increased cash crops.

② The commercial infrastructure such as road network, communication network, and financial services should be improved.

(2) Official support

① Technical extension services shall be improved and strengthened in the following fields:

- Post-harvest processing
- Agro-processing
- Business management including marketing

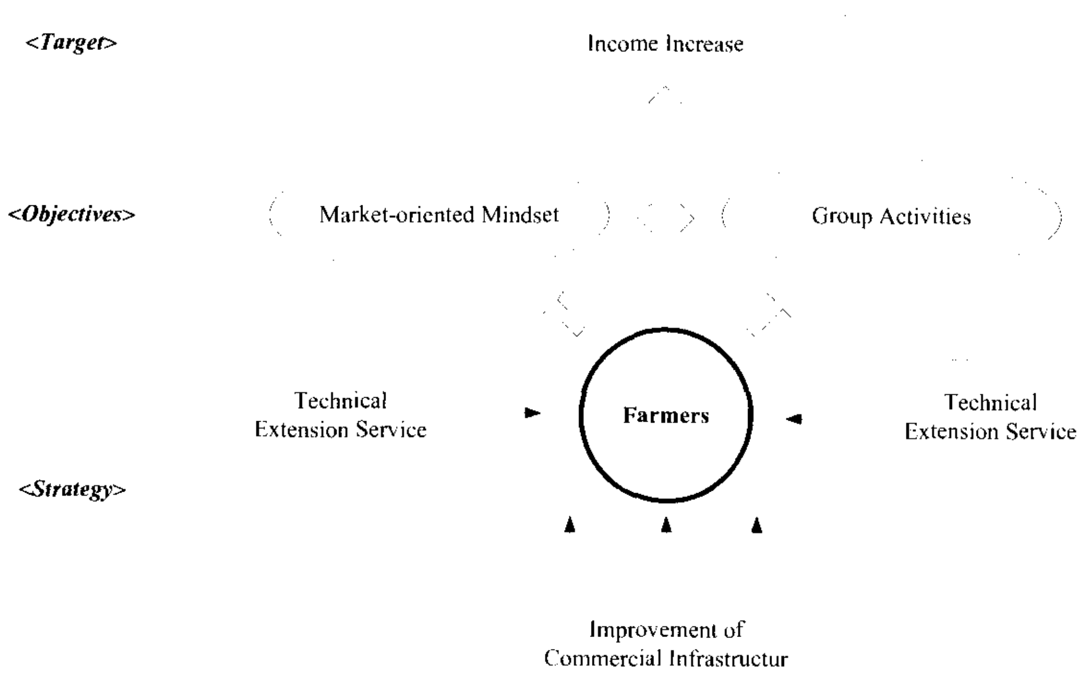
② Institutional supports for promotion and maintenance of sound commercial circumstances shall be strengthened in the following fields:

- Standard and quality control of commodities
- Market information system
- Establishment of an inspection authority for scales and spreading the use of scales

(3) Farmers

Receiving the official support and services above, the farmers will be aware of the following conditions:

- Market-oriented activities derived from the changed mind-set and/or the entrepreneurial mind.
- Group activities for expanding and improving of the business capacity in view of efficiency and economy




**Development Concept**

## IV-2.6 Development Program

### *IV-2.6.1 Development Activity*

The necessary activities for development of marketing and agro-processing fields in the Study Area are considered and compiled in the table below. It contains the various external conditions concerning each activity such as other fields than marketing and agro-processing and the administrative level in charge that may be beyond the scope of the Study and the Study Area.

**Necessary Activities for Development and External Conditions**

| Category | Activities | Imple. Agency | Other Fields | Admin. Level in Charge | | |
|---|---|---|---|---|---|---|
| | | | | Gewog | Dzongkhag | Nation |
| Technical Extension | 1) D&R activities shall be strengthened to establish improvement measures to the traditional P/H practice. | PHU/ MOA | | | | ○ |
| | 2) Strengthening extension services of post-harvest processing technology including marketing. | RNR-RC EO | ○ | ○ | ○ | ○ |
| | 3) Strengthening extension services of agro-processing technology including business management. | RNR-RC EO | | | ○ | ○ |
| Institutional Support | 4) Improvement and strengthening collection of more regional information and dissemination of useful information to farmers. | AMS/ MOA DAO | | | ○ | ○ |
| | 5) Strengthening marketing support to farmers. | AMS/ MOA RNR-RC | | | ○ | ○ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 6) Establishment and promotion of grading and packing standards | AMS-QCS /MOA | | | | ○ |
| | 7) Establishment of a scale inspection authority and promotion of scale use. | | ○ | | | ○ |
| Infrastructure | 8) Improvement and expansion of the road network. | | ○ | ○ | ○ | ○ |
| | 9) Improvement and expansion of the information infrastructure. | | ○ | | ○ | ○ |
| | 10) Improvement of financial services | BDFC | ○ | | | ○ |
| | 11) Construction of collection depots for products | | | ○ | ○ | |
| Farmers Group | a) Group assembling | | | ○ | ○ | |
| | b) Group assembling and marketing | | | ○ | ○ | |
| | c) Support activity by the FCB | FCB | | | ○ | ○ |

### *IV-2.6.2 Proposed Development Program*

So far, the necessary activities for the above-mentioned developments in view of the various external requirements and the bureaucratic demarcation were taken into consideration and screened. Now, the following development programs, as Sub-programs for the Development Programs formulated among the Study Team, are prepared and proposed in the field of marketing and agro-processing. Those Sub-programs are adjusted and treated as the components for the three Development Programs under the RADP-LM, mainly for the Program named "Market System Development Program".

**Proposed Sub-programs and their Allocation**

| No. | Sub-program | Program |
|---|---|---|
| 1 | Collection Depot Construction | Market System Development Program |
| 2 | Group Assembling | |
| 3 | Group Assembling and Marketing | |
| 4 | Marketing Support by FCB | |
| 5 | Post-Harvest Technology Training for Food Crop | Program for Food Crop Production Increase* |
| 6 | Market Research | Program for Cash Crop Production Strengthening |
| 7 | Post-Harvest Technology Training for Cash Crop* | |
| 8 | Agro-processing Technology Training | |

*Component for training Sub-program in the Program.

The description of each program is prepared and compiled in Table IV-2.

### *IV-2.6.3 Market System Development Program*

The Market System Development Program is solely prepared in view of the marketing field, and the details are shown below.

(1) Objectives

The objectives of the Marketing System Development Program are to support the farmers in marketing of the increased production of cash crop. That will be promoted and strengthened by the integrated support program of the "Cash Crop Production Strengthening Program" to ensure the increase of cash income of farmers.

(2) Implementing Agency

Dzongkhags will be responsible for implementing this Program. Each Dzongkhag will coordinate the execution of Sub-programs and support persons and groups concerned during the implementation of the Program.

(3) Components

The Program consists of four Sub-programs and the detailed description of each Sub-program is shown in the Table IV-2.

(4) Application Plan to Gewogs

Each Sub-program will be implemented Gewog-wise and the application plan will be prepared by the development stages of Gewogs according to the Development framework (See the Section 2.3).

**Application Plan of Sub-program to Gewogs**

| No. | Sub-program | Stage of Gewog | | | Application Plan |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | |
| 1 | Collection Depot Construction Sub-program | △ | ○ | ○ | According to the road construction Sub-program, it will be applied in Gewogs of Stage - 2 & 3, including some of Stage - 1.<br>Four Gewogs having markets already are excluded. |
| 2 | Group Assembling Sub-program | | ○ | ◎ | After construction of collection depots, it will be started in Stage - 2 & 3 Gewogs. |
| 3 | Group Assembling and Marketing Sub-program | | | ○ | It will be developed from the activities of "Group Assembling Sub-program" above in Stage - 3 Gewogs. |
| 4 | Marketing Support Sub-program by FCB | | ○ | ◎ | The program will support the group assembling activities for marketing the assembled products especially before starting group marketing by farmers. |

(5) Development Effects

The development effects among the development stages of Gewogs, defined by the Development framework, which will be derived from implementation of the Sub-programs during the development period up to 2012, are expected by the some parameters as follows:

**Development Effect by Gewog Group**

| Parameter | Stage of Gewog | | |
|---|---|---|---|
| | Stage-1 | Stage-2 | Stage-3 |
| Income increase by marketing of agricultural products | Less | ⟷ | More |
| Quantity of marketed products | | | |
| Numbers of middlemen | | | |
| Market oriented activity among farmers | | | |
| Farmers group activity | | | |
| Participation of farmers to the other activities than farming in the field of marketing and processing | | | |

Thus, the development prospective by stage of Gewogs cannot expect equal conditions mainly due to the accessibility to the commercial infrastructure as described in the Section 2.3.4 before.

### *IV-2.6.4 Implementation Schedule*

The implementation schedule of the Sub-programs shall be considered by the factors affecting the activities of each Sub-program. The considered factors are listed in the table below:

**Considering Factors for Implementation Schedule**

| No. | Sub-program | Factors |
|---|---|---|
| 1 | Collection Depot Construction Sub-program | Farm road construction schedule |
| 2 | Group Assembling Sub-program | Existence of market and collecting depot |
| 3 | Group Assembling and Marketing Sub-program | Time when the quantity of assembled products will exceed 6 tons/ day in each depot. |
| A | Marketing Support Sub-program by FCB | Time when 10% of marketable products will exceed 6 tons/ collection day among all collection depots and markets. |
| B | Market Research Study Sub-program | Early time in the development period. |
| C | Post-Harvest Technology Extension Sub-program for Food Crop | Relation to implementing schedule of other Sub-programs concerned. |
| D | Post-Harvest Technology Extension Sub-program for Cash Crop | |
| E | Agro-processing Technology Extension Sub-program | |

Based on the factors in the table above, the implementation schedule of the Sub-programs for the Market System Development Program was considered and prepared in Table IV-3.

### *IV-2.6.5 Target Gewogs of Sub-programs*

The target Gewogs as the beneficiaries by implementation of the Sub-programs that the farmers will not be involved directly to implementations are clarified in the table below:

**Target Gewogs of Sub-programs**

| No | Sub-program | Stage of Gewogs | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| A | Marketing Support Sub-program by FCB | △ | ○ | ◎ |
| B | Market Research Study Sub-program | ○ | ○ | ○ |
| C | Post-Harvest Technology Extension Sub-program for Food Crop | ○ | ○ | ○ |
| D | Post-Harvest Technology Extension Sub-program for Cash Crop | ○ | ○ | ◎ |
| E | Agro-processing Technology Extension Sub-program | △ | ○ | ◎ |

# CHAPTER 3 ACTION PLAN

## IV-3.1 Definition of the Action Plan

The Action Plan is a detailed plan consisting of the following five factors: 1) Identification of stakeholders who should play a certain role in the implementation of proposed programs. 2) Clarification of the role and responsibilities by stakeholders. 3) Identification of actions to be taken by stakeholders. 4) Setting of a time schedule for each action. 5) Formation of monitoring and coordination of each action.

## IV-3.2 Action Plan Sheet

In order to make the formulation process of the Action Plan transparently, and to enable an easy and comprehensive modification, an "Action Plan Sheet" was prepared for each Sub-program. The Action Plan Sheets for each Sub-program are attached to the Report. Hereinafter, the Report will deal with only the basic description of the Action Plan. The detailed contents of the Action Plan are shown in the Action Plan Sheets.

## IV-3.3 Post-harvest Technology Training Sub-program (Action Plan Sheet AP-6)

The Sub-program is a component in the Program of the Food Crop Production Increase.

### (1) Background

The very conventional post-harvest processing for food crops, which is grains, dominates in the Study Area and no mechanization of post-harvest processing has been introduced yet on the farmers' level. Though no official loss assessment study has ever been carried out it can still be said that the post-harvest losses occur especially during the storage in the lowland area.

However, the improvement of a post-harvest processing with full knowledge about characteristics of grains has not yet been carried out. This subject is not included in the present extension activities by EAs.

### (2) Basic concept

To cope with such a condition, the "Post-harvest Technology Training Sub-program" was formulated as regards the following objective and concept.

#### (a) Objective

The objective of the Sub-program is to reduce the post-harvest losses of grains and to support food sufficiency of farmers through the introduction of a technical extension program.

#### (b) Strategy

The basic activities of the Sub-program are as follows.

- As the Post-Harvest Unit (PHU) has recently been established under MOA and started its activities, PHU will support the training program, and guidance will also be prepared with the support from PHU.

- The training to EAs will be carried out in collaboration with the staff of PHU and RNR-RC, based on the training program and guidelines mentioned above.

Thus, the Sub-program aims at introducing the training and extension subject concerning post-harvest processing technologies to the existing Agricultural Extension System. Therefore, the Sub-program will be implemented in one year (2004) and the actual extension activities will follow in the "Extension Strengthening Program". Hence the improvement of post-harvest processing technologies for farmers will continue and be implemented by the strengthened agricultural extension system.

### IV-3.4 Market Research Sub-program (Action Plan Sheet AP-7)

The Sub-program is a component in the Program for Cash Crop Production Strengthening.

(1) Background

Almost all farmers in the Study Area have very limited chance to receive market information and they do not recognize which crops and plants are marketable and promising in the future. Additionally, the officials concerned, such as researchers, administrators, and extension officers, have not either reached a consensus for prospective crops and plants in the Study Area. Consequently, whenever they focus on cash crop products for improving and strengthening production and marketing the products taken into consideration are those being currently popular in the exporting market such as potatoes, oranges, chili, and apples.

On the other hand, the local market is very small and limited and will not expand drastically even in the future. Then it will hardly absorb the increased cash crop production extended by the Master Plan in the future, so farmers shall gain access to and sell their products in the foreign market to ensure an income increase.

For the products in the Study Area, and those from four other Dzongkhags in eastern Bhutan, the outlet to the foreign market is basically Samdrup Jongkhar. Two Dzongkhags in the Study Area are geographically situated in disadvantageous locations to three Dzongkhags, namely Samdrup Jongkhar, Pemagatshel and Trashigang. As expected, the products from he Study Area had a share of only 8 % among all products auctioned in the auction yard in Samdrup Jongkhar in 2001.

Under such circumstances, the farmers as well as middlemen in the Study Area are facing difficulties. The question is how they can keep a sound profit in the market and the auction yard in Samdrup Jongkhar in the competition against those products coming from the advantageous Dzongkhags. Such a situation will never change as far as they produce and sell the same products as the other Dzongkhags.

(2) Basic concept

There is still ample room for the farmers to make efforts to reduce costs and to raise the price of products. That would solve the question of a disadvantageous position, and they could take part in a sound competition at the market in Samdrup Jongkhar. This kind of efforts will be one of the directions of the development activities seeking income increase of farmers in the Study Area on a short term basis. However the competitors in other Dzongkhags will gain ascendancy over such temporary preferable condition, inevitably they have also similar natural condition for agricultural production. Therefore, it must be recognized that it is the destiny of the Study Area to live with the existing disadvantage even in the future.

To cope with such a disadvantageous condition, the "Market Research Sub-program" is formulated as regards the following objective and strategies.

(a) Objective

The objective of the Sub-program is to ensure the income increase of farmers through the introduction of prospective crops and plants that will create a comparative advantageous condition in the market.

(b) Strategies

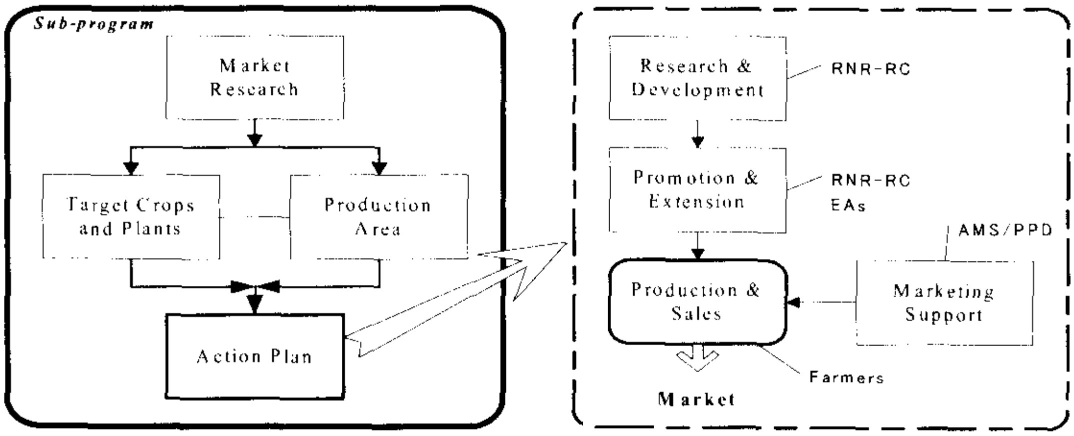
To realize the objective, the Sub-program aims at establishing a market research system in the RNR-RC east and at carrying out activities by the following strategies.

- To carry out a market research not only on the local but also on the foreign market.
- To assess the market potentials and competitiveness of local crops and plants that can be produced and collected in the Study Area.
- To find out the target crops and plants expected to be of higher potential, profitability and competitiveness. For the selection of the target crops and plants, their applied production area shall be considered and specified in view of productivity and marketability. The following measures shall be considered for the selection of products and production areas in view of marketing.

**Measures to be considered for Selection of Products and Production area**

| Expected characteristics of products | Advantageous areas | Accessible areas | Remote areas |
|---|---|---|---|
| | Along E-W Highway eastern from Mongar | Along motorable roads | Difficult access to motorable roads |
| Products specified in the Area | ←—— | ———— | ——→ |
| Major and popular products in market | ←—— | ——→ | |
| Perishable products | ←—— | ——→ | |
| Light weight products of high value | | ←— | ——→ |

- To formulate the action plan for the introduction of the target crops and plants the production increase shall reflect the cash crop development plan.




**Outline of Strategies**

## IV-3.5 Agro-processing Technology Training Sub-program (Action Plan Sheet AP-10)

The Sub-program is a component in the Program for Cash Crop Production Strengthening.

(1) Background

In the Study Area, the activity called industry has not been established yet. Only some farmers who can buy the machinery have started the service activities for other farmers such as rice milling, corn grinding, and oil extraction. Almost none of the fundamental industries for the products, such as food processing machinery and equipment, consumables, packaging materials, and chemicals used for agro-processing industry, exist in Bhutan. Therefore, the agro-processing industry for export or import substitution is facing a disadvantageous condition compared to foreign competitors in view of production costs. As expected, various imported agro-processing commodities from India dominate the local market.

(2) Basic concept

As the Study Area is located far from Samdrup Jongkhar, the gate for import and export, this is not an advantageous location to establish an agro-processing factory aiming at export or import substitution. Therefore, the Sub-program is formulated for generating small and simple agro-processing activities in the Study Area by targeting the local market for the moment.

(a) Objective

The objective of the Sub-program is to generate and increase opportunities for inhabitants, especially women, to participate in the agro-processing activities and to realize an income increase.

(b) Strategies

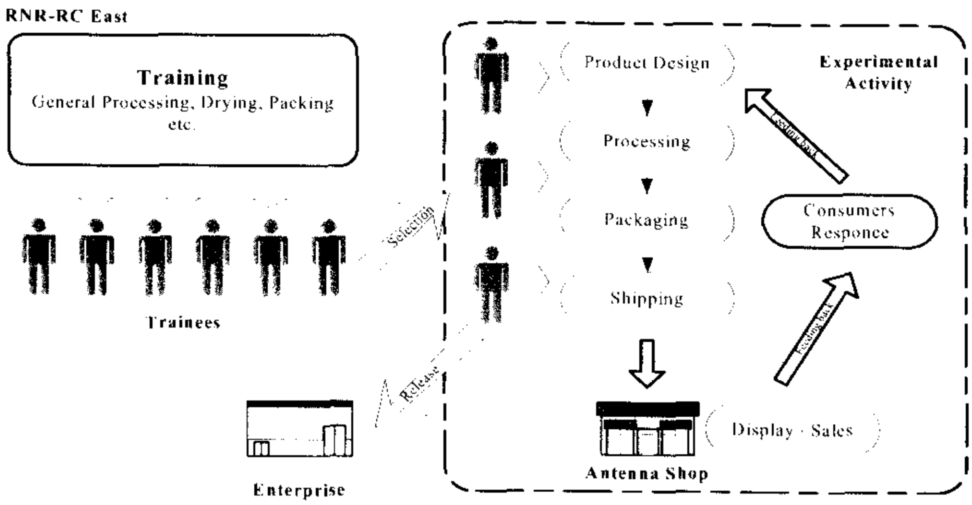
To achieve the objective, the following strategies were set up and training and experimental facilities will be constructed in RNR-RC east.

- To promote small processing activities on a family basis on the village and town level by spreading general and simple agro-processing and marketing technologies to inhabitants, especially women, through the training program.

- To select trainees from the training program above-mentioned, organize a group and incubate small agro-processing enterprises through experimental processing and sales activities.

These experimental activities will be carried out by actual development activities from product design to sales in the trial and error way, and they will develop the products appreciated and accepted in the local market.

To sell the developed products and to collect the consumers' responses, a trial sales shop (antenna shop) is necessary that shall be located in a place crowded with consumers. The most suitable place in the Study Area is the center in Mongar town. There, the square is equipped with a weekly market and used for the bus terminal where the local people gather and the passengers from other areas using the bus also stop over. Some parts of the market facilities originally planned for meat selling are not in use now. It is recommendable to use the abandoned facility for this shop in cooperation with Dzongkhag and the Municipality Office.




**Outline of Strategies**

### IV-3.6 Market System Development Program (Action Plan Sheet AP-11, 12)

(1) Background

In the Study Area, the free market mechanism has not been established yet. The local markets are almost isolated from each other and farmers are facing difficulties to find out information and to expand their markets. This factor also impedes the incentives to increase the cash crop production.

On the other hand, the local market is very small and limited and will not expand drastically even in the future. Therefore, it will hardly absorb the increased cash crop production extended by the "Program for Cash Crop Production Strengthening" in the future. This means that farmers shall access and sell their products more in the foreign market to ensure an income increase.

For the products in the Study Area, the outlet to foreign markets such as India is basically Samdrup Jongkhar. However, at present, only a small quantity of products in limited areas such as Drametse Gewog is shipped to Samdrup Jongkhar.

(2) Basic concept

Taking into consideration the difficult situation of marketing the agricultural products in the Study Area as mentioned above, the comprehensive program consisting of four Sub-programs is formulated for the improvement of the marketing conditions for farmers in the Study Area.

(a) Objective

The objective of the four Sub-programs is to mutually expand the marketing capacities of farmers and thus to ensure the income increase together with the "Program for Cash Crop Production Strengthening".

(b) Strategies

To achieve the objective, the following strategies were set up.

- To construct collection depots beside motorable roads for the gathering of products to economic units for transportation because the shipping unit of individual farmers at one time is very small, from one to ten baskets and/or bags (60 - 600 kg), even though they will be able to gain better access to motorable roads after the construction of farm roads.
- To establish a management system among organized farmers for collecting their products in an economical order and for motivating buyers to come to a depot.
- To develop farmers group activities mentioned above and to make those more profitable and marketable by introducing quality control, such as grading and repacking, and by encouraging direct sales to the auction yard in Samdrup Jongkhar.
- To establish the marketing support system for farmers group activities above-mentioned that will be carried out by FCB. This system will provide them with the option of sales channels other than middlemen and will generate the competitive circumstance among buyers, which will make the situation better for farmers.

The activities excepting the support program by FCB are abstracted in Fig. IV-4.

(c) Linkage between Sub-programs

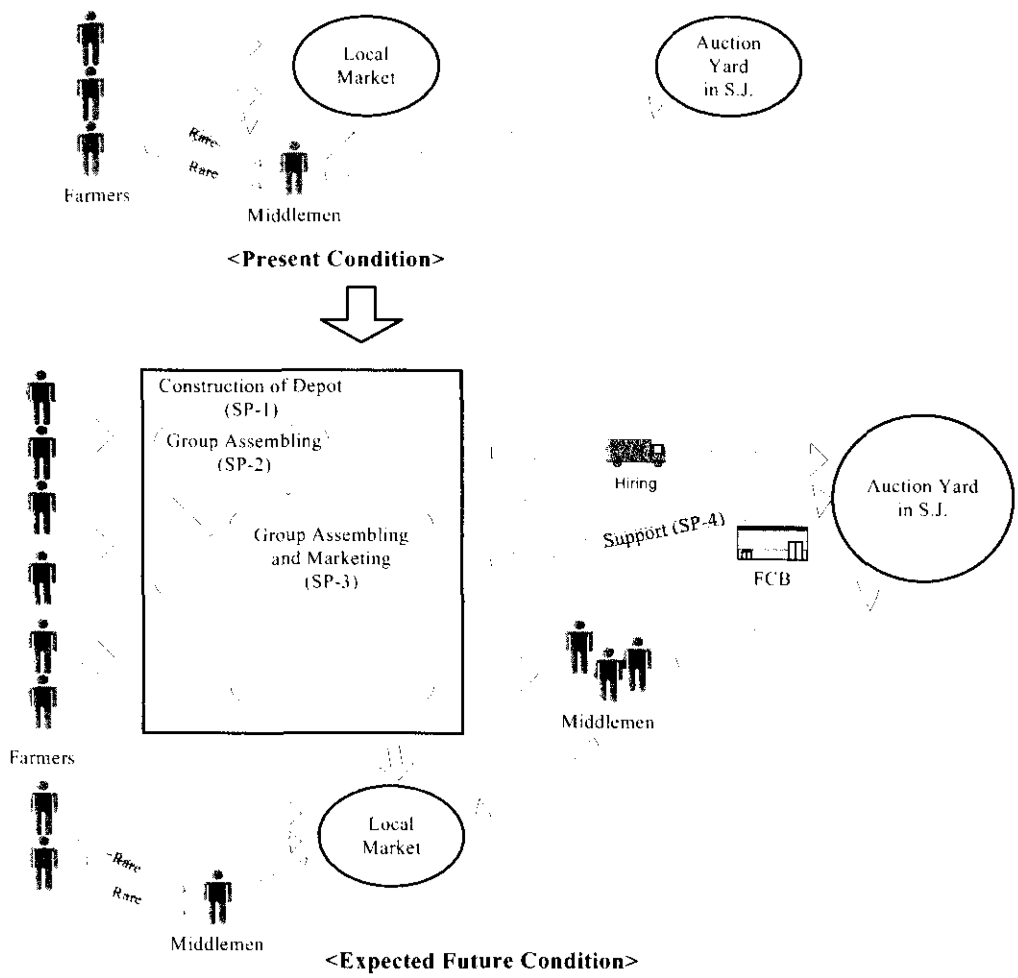
To realize the strategies above, the linkage between the activities of the four Sub-programs is clarified and shown in the following table.

**Linkage between Activities of Four Sub-programs**

| Code | Name of Sub-program | Linkage of Activity |
|---|---|---|
| SP1 | Collection Depot Construction | Provision of collection depots where farmers group activities promoted by SP2 and SP3 will be realized. |
| SP2 | Group Assembling | Provision of group assembling and sales activities among farmers using collection depots constructed by SP1. |
| SP3 | Group Assembling and Marketing | Provision of more sophisticated and profitable activities based on the activities by SP2. |
| SP4 | Marketing Support by FCB | Provision of support service as collection, transportation and sales at the auction yard in Samdrup Jongkhar for the farmers group activities mentioned above. |

As shown above, the Sub-programs especially SP1 to SP3 are closely related to each other. Out of practical reasons, the Action Plan for these three Sub-programs shall be considered together and prepared in one Action Plan Sheet. The two Action Plan Sheets, one for SP1 - SP3 and the other for SP4, are prepared separately in the attachment.

As the result of the joint operation on the Sub-programs mentioned above, the marketing options of the products will be expected and abstracted in the following figure.




**Expected Marketing Condition Compared to the Present Condition**

These Sub-programs, however, aim at the shipment by truck and cannot be applied to

Gewogs without any motorable roads. Existing shed markets in some Gewogs will be used as collection depots without constructing any new depots. The application conditions to each Gewog are different and clarified in the following table.

**Application Condition of Sub-programs**

| Gewogs | SP1 | SP2 | SP3 |
|---|---|---|---|
| Gangzur, Drametse, Mongar, Ngatshang, Saleng | - | ○ | ○ |
| Menbi, Minjay, Tsenkhar, Balam, Chali, Chaskhar, Serimuhang, Tsakaling | ○ | ○ | ○ |
| Kurtoe, Metsho, Drepong, Thangrong | ○ | ○ | - |
| Jaray, Khoma, Gongdue, Jurme, Kengkhar, Silambi, Tsamang | - | - | - |

The attached Action Plan Sheet for SP1 - SP3 covers all contents of the three Sub-programs to be applied at eight Gewogs. Some of the contents covered by SP1 or SP3 shall be deleted for other Gewogs according to the application conditions in the above table.

Additionally it must be said that the Programs cannot be applied to the remote seven Gewogs for the sake of convenience because no motorable roads are expected to be constructed during the project period. However, it is advisable that Gewogs will also promote farmers group activities and that they will transport their products to the nearest shed market or depot in the neighboring Gewog, after getting the agreement from farmers groups and Gewogs concerned. The farm mule track that will be constructed in the Farm Road Construction Plan will be effective for this activity. For example, the farmers group in Khoma may join the group assembling activity in Gangzur or Menbi.

(3) Expected participation rate of farmers

Regarding the three priority Gewogs, namely Gangzur in Lhuntse Dzongkhag and Chaskhar and Drepong in Mongar Dzongkhag, the Study Team had a series of the meetings with Gup, Chimi, EAs, GYT members and representatives of farmers in each Gewog for the formulation of the Action Plan. The expected participation rate of farmers as the target for these activities was one of the hot topics. They discussed how they would promote and convince the farmers in their Gewogs. Actually, their calculated figures were different from each other as indicated in the table below. It is judged that such discrepancy was due to various background factors such as leadership ability of Gup and other leaders, the distribution condition of farmers' houses, and the traditional farmers' mindset for collective activities in each Gewog.

**Expected Participation Rate in Priority Gewogs**

| Gewog | Expected Participation Rate | No. of Households |
|---|---|---|
| Gangzur | 60 % | 275 |
| Chaskhar | 40 % | 160 |
| Drepong | 80 % | 174 |

Based on the result of the priority Gewogs mentioned above and the experience from such discussions, the average targeted participation rate from other Gewogs is roughly estimated at 50 %. As for this participation rate, the tentative annual figure of each Gewog is estimated and compiled in the table below in accordance with the implementation schedule of each Gewog and the average escalation trend to the target figure.

**Expected Participation Rate (%) of Farmers by Year**

| | | Dev. Stage | Depot Existing | 0<br>2002 | 1<br>2003 | 2<br>2004 | 3<br>2005 | 4<br>2006 | 5<br>2007 | 6<br>2008 | 7<br>2009 | 8<br>2010 | 9<br>2011 | 10<br>2012 | Lack |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lhuntse | ***Gangzur**** | 2 | ◎ | | | 20 | 30 | 40 | 50 | 60 | 60 | 60 | 60 | 60 | |
| | Jaray | 1 | - | | | | | | | | | | | | X |
| | Khoma | 1 | - | | | | | | | | | | | | X |
| | Kurtoe | 1 | - | | | | | | | **20** | 30 | 40 | 50 | 50 | |
| | Menbi | 3 | - | | | | **20** | 30 | 40 | 50 | 50 | 50 | 50 | 50 | |
| | Metsho | 1 | - | | | | | | | | | **20** | 30 | 40 | |
| | Minjay | 2 | - | | | | **20** | 30 | 40 | 50 | 50 | 50 | 50 | 50 | |
| | Tsenkhar | 2 | - | | | | | **20** | 30 | 40 | 50 | 50 | 50 | 50 | |
| Mongar | Balam | 2 | - | | | | | | | | **20** | 30 | 40 | 50 | |
| | Chali | 2 | - | | | | **20** | 30 | 40 | 50 | 50 | 50 | 50 | 50 | |
| | ***Chaskhar**** | 3 | - | | | **20** | 30 | 35 | 40 | 40 | 40 | 40 | 40 | 40 | |
| | Drametse | 2 | ◎ | | | 20 | 30 | 40 | 50 | 50 | 50 | 50 | 50 | 50 | |
| | ***Drepung**** | 1 | - | | | | | | **30** | 40 | 50 | 60 | 70 | 80 | |
| | Gongdue | 1 | - | | | | | | | | | | | | X |
| | Jurmey | 1 | - | | | | | | | | | | | | X |
| | Kengkhar | 1 | - | | | | | | | | | | | | X |
| | Mongar | 3 | ◎2 | | | 20 | 30 | 40 | 50 | 50 | 50 | 50 | 50 | 50 | |
| | Ngatshang | 3 | ◎ | | | | 20 | 30 | 40 | 50 | 50 | 50 | 50 | 50 | |
| | Saleng | 2 | ◎ | | | | 20 | 30 | 40 | 50 | 50 | 50 | 50 | 50 | |
| | Sherimuhung | 2 | - | | | | | | | **20** | 30 | 40 | 50 | 50 | |
| | Silambi | 1 | - | | | | | | | | | | | | X |
| | Thangrong | 1 | - | | | | | **20** | 30 | 40 | 50 | 50 | 50 | 50 | |
| | Tsakaling | 2 | - | | | | | **20** | 30 | 40 | 50 | 50 | 50 | 50 | |
| | Tsamang | 2 | - | | | | | | | | | | | | X |
| | Average | | 6 | | | 20.0 | 24.4 | 30.4 | 39.2 | 43.3 | 45.6 | 46.5 | 49.4 | 51.2 | |

* Priority Gewog: Rate was estimated and decided at the meeting with GUP, EAs and other people concerned.

Note: Bold figures show a depot construction year.

(4) Expected handling quantity

Presupposing that farmers sell all of their marketable cash crop production through the depot or the shed market the roughly estimated handling quantity in 2012, the last year of the project period, will be as shown in the following table. Details are shown in Table IV-4.

**Expected Handling Quantity in Each Gewog (2012)**

(ton)

| Lhuntse | Vegetable | Fruits | Total | **Hndled** | Mongar | Vegetable | Fruits | Total | **Handled** |
|---|---|---|---|---|---|---|---|---|---|
| Gangzur | 689 | 424 | 1,113 | 668 | Balam | 163 | 115 | 278 | 139 |
| Kurtoe | 180 | 102 | 282 | 141 | Chali | 550 | 284 | 834 | 417 |
| Menbi | 729 | 263 | 992 | 496 | Chaskhar | 842 | 382 | 1,224 | 490 |
| Metsho | 220 | 132 | 352 | 141 | Drametse | 1,442 | 588 | 2,030 | 1,015 |
| Minjay | 239 | 289 | 528 | 264 | Drepong | 260 | 179 | 440 | 352 |
| Tsenkhar | 363 | 253 | 616 | 308 | Mongar | 968 | 332 | 1,300 | 650 |
| | | | Total | 2,017 | Ngatshang | 563 | 266 | 829 | 415 |
| | | | | | Saleng | 440 | 359 | 799 | 399 |
| | | | | | Serimuhung | 404 | 213 | 616 | 308 |
| | | | | | Thangrong | 411 | 139 | 550 | 275 |
| | | | | | Tsakaling | 697 | 288 | 985 | 493 |
| | | | | | | | | Total | 4,951 |
| | | | | | | | | G.Total | 6,969 |

Note: Marketable quantity is estimated and planed by the "Extension Strengthening for Cash Crop SP".

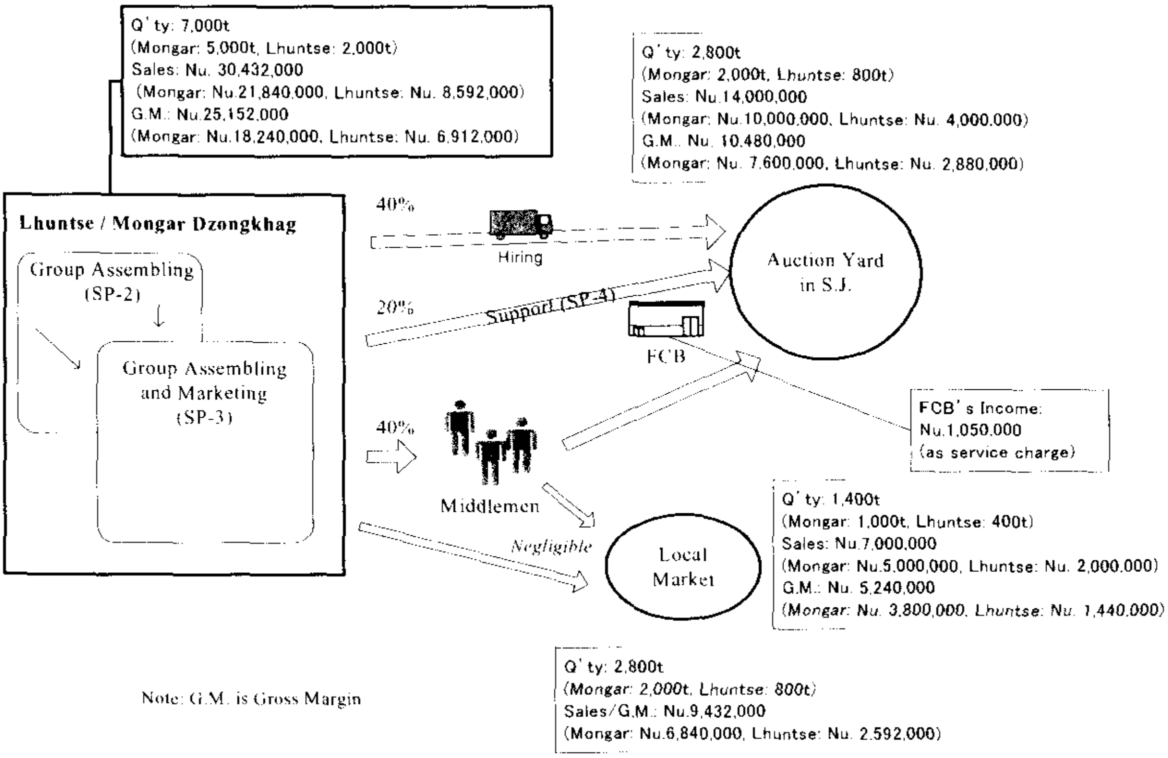
It is estimated that about 7,000 tons of products will be shipped and sold in the Study Area by the Program in one year.

(5) Prospects for distribution and sales amount

According to the handling quantity estimation in 2012 mentioned above, the entire distribution condition and sales amount in 2012 is roughly and tentatively estimated by the precondition in the table below and the results are shown in the figure. The detailed result is indicated in Table IV-5.

**Precondition for Sales Amount Estimation in 2012**

| Item | Condition |
|---|---|
| Sales condition | Direct sales: 40 %, Sales to middlemen: 40 %, FCB's support: 20 % |
| Unit price for sale to middlemen | 10 % less then the unit price for direct sales after deduction of transportation costs and costs at the auction yard. |
| Unit price for direct sales and for FCB support program (SP4) | Nu. 5 / kg according to the recent average price of vegetables and fruits at the auction yard in Samdrup Jongkhar. |
| Transportation costs to the auction yard | Mongar: Nu. 0.8 / kg<br>Lhuntse: Nu. 1.0 / kg |
| Costs at the auction yard | Handling charge: Nu. 0.25 / kg<br>Service charge: 3 % of auctioned amount |




**Prospects for Distribution and Sales Amount in 2012**

According to the above-mentioned prospects, the average sales condition of participating farmers in each Dzongkhag is estimated in the table below. The details of each Gewog are shown in Table IV-6.

**Average Sales Condition of Participating Household in Dzongkhag**

| Dzongkhag | Participating Households | Sales / H.H.(Nu.) | Gross Margin / H.H. (Nu.) |
|---|---|---|---|
| Lhuntse | 1,010 | 8,507 | 6,884 |
| Mongar | 1,771 | 12,332 | 10299 |
| Total */ Average | 2,781* | 10,943 | 9,044 |

The Program will provide an average of Nu. 10,000 of sales amount and of Nu. 9,000 of gross margin to a participating household.

Among all, the prospects for the three priority Gewogs are as follows.

**Prospects for Distribution and Sales Amount of Priority Gewogs in 2012**

| Gewog | Sales Q'ty (ton) | Sales Amount (Nu.) | S.A./Household (Nu.) | Gross Margin (Nu.) | G.M. /Household (Nu.) |
|---|---|---|---|---|---|
| Gangzur | 668 | 2,844,131 | 10,327 | 2,288,016 | 8,308 |
| Chaskhar | 490 | 2,160,630 | 13,470 | 1,804,482 | 11,250 |
| Drepong | 352 | 1,552,126 | 8,941 | 1,296,281 | 7,467 |

# *Tables*

## Table IV-1 Market Price of Major Commodities in Lhuntse and Mongar

| <Lhuntse> | | 2001 | | | | | | | | | | 2002 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Commodity | Unit | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
| Cereals | | | | | | | | | | | | | | | | | |
| Local white rice | kg | | | | | | | | | | | | | 20 | | 30 | 30 |
| Maize | kg | | | | 18 | | | | | | | | | | | | |
| Bean (flat type) | kg | | | | | | | | | | | | | 27.5 | | | |
| Bean (round type) | kg | | | | | | | | | | | | | 26.6 | | 17.1 | 17.5 |
| Vegetables | | | | | | | | | | | | | | | | | |
| Cabbage | kg | | | | | | | | | | | | | 12.9 | | 10 | 10 |
| Carrot | kg | | | | | | | | | | | | | 20 | | 15 | 13.8 |
| Green chili | kg | | | | | | | | | | | | | | | 79.4 | 29.3 |
| Potato (red) | kg | | | | | | | | | | | | | 10 | | 10.5 | 10 |
| Potato (white) | kg | | | | | | | | | | | | | 10 | | 10 | 10 |
| Tomato | kg | | | | | | | | | | | | | 17.1 | | 11.9 | 11.5 |
| Radish | kg | | | | | | | | | | | | | 4.9 | | 9.3 | 5 |
| Fruits | | | | | | | | | | | | | | | | 15 | 15 |
| Apple | kg | | | | | | | | | | | | | | | | |
| Mango | kg | | | | | | | | | | | | | | | | |
| Peach | kg | | | | | | | | | | | | | | | 25 | |
| Pear | kg | | | | | | | | | | | | | | | 10.6 | |

| <Mongar> | | 2001 | | | | | | | | | | 2002 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Commodity | Unit | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
| Cereals | | | | | | | | | | | | | | | | | |
| Local white rice | kg | | | | | | | 25 | 22 | 24 | 25 | | 25 | 20 | 25.5 | | |
| Maize | kg | | | | | 8 | | | | | | | | | | | |
| Bean (flat type) | kg | 25 | | 15 | 12 | 10 | 18 | 14 | 20 | 17 | 18 | | 25 | 27.5 | 24 | 22.5 | 14.2 |
| Bean (round type) | kg | 20 | 30 | 20 | 15 | 12 | 17 | 15 | 18 | 13 | 17 | | 25 | 26.6 | 27.2 | 26.1 | 17.8 |
| Vegetables | | | | | | | | | | | | | | | | | |
| Cabbage | kg | 9 | 8 | 10 | 11 | 13 | 14 | 11 | 16 | 18 | 16 | | 10 | 16 | 16.7 | 22.5 | 19.2 |
| Carrot | kg | 16 | 18 | 15 | 20 | 20 | 19 | 21 | 16 | 20 | 19 | | 20 | 20 | 17.5 | 24.2 | 22.5 |
| Green chili | kg | | | 34 | 22 | 20 | 19 | 21 | 24 | 27 | 30 | | | | 75 | 39.2 | 29 |
| Potato (red) | kg | 10 | 10 | 7 | 8 | 8 | 9 | 8 | 9 | 10 | 13 | | 10 | 10 | 10 | 9.3 | 10 |
| Potato (white) | kg | 9 | 9 | 6 | 7 | 7 | 8 | 7 | 8 | 14 | 13 | | 10 | 10 | 10 | 9.8 | 9.7 |
| Tomato | kg | 16 | 21 | 20 | 19 | 16 | 19 | 24 | 22 | 25 | 30 | | 14 | 17.3 | 19.8 | 18.3 | 26.3 |
| Radish | kg | 5 | 8 | 7 | 7 | 5 | 6 | 5 | 6 | 5 | 5 | | 5 | 4.9 | 8.3 | 10 | 8.7 |
| Fruits | | | | | | | | | | | | | | | | | |
| Apple | kg | | | | 40 | 25 | 25 | 26 | 20 | | | | | | | | 25 |
| Mango | kg | | | | | 20 | 28 | 30 | | | | | | | | 50 | 50 |
| Peach | kg | | | | | 6 | | | | | | | | | | | |
| Pear | kg | | | | | 25 | 23 | 25 | 18 | | 7 | | | | | | |

Source: AMS/PPD, MOA
Remark: No survey in months of blank column

**Table IV-2 Sub-program Descriptions** (1/8)

| | | |
|---|---|---|
| **Title** Post-harvest Technology Training for Food Crop | | **Stage of Gewog**: - |
| **Implementing Organization** | Dzongkhag Office | |
| **Agency concerned** | Supported by PHU/MOA | |

**Objectives**:
To extent improved post-harvest processing technology for food crop and reduce losses and improve the condition of food self-sufficiency.

**Input**:
None

**Activities**:
1) Creation of P/H technology training program in consultation with the PHU, covering the fields of drying, threshing and storage.
2) Carrying out the training to the agricultural extension officers (EAs).

**Expected effects / profits**:
1) Establishment of technical transferring linkage from the PHU as R & D agency to farmers.

**Remarks**:
-

**Table IV-2 Sub-program Descriptions** (2/8)

| | | |
|---|---|---|
| **Title** Market Research | | **Stage of Gewog**: - |
| **Implementing Organization** | RNR-RC-West | |
| **Agency concerned** | Cooperated by AMS | |

**Objectives**:
To ensure the sustainable income increase of farmers through the integrated development of selected export products.

**Input**:
1) Participation of foreign experts.
a) OJT of market research technology to official concerned

**Activities**:
1) Organizing the study team by the following members:
Team leader: Program Director of RNR-RC
Staff of RNR (2)
Staff of AMS/PPD (1)
Staff of FCB
Extension officers
Foreign experts (2)
2) Carrying out local market research
3) Dividing two groups in charge of markets in India + Southeast Asia and in Europe separately.
4) Selecting 5 to 6 target crops by analysis of the survey result and prepare the integrated development and action plan of each crop by each sector concerned such as R & D activity, extension activity, and marketing activity.

**Expected effects / profits**:
1) Demonstration effect of market research.
2) Promotion of the comparative advantage condition of selected crops / plants produced in the Study Area.
3) Maintaining the sustainable circumstance for income increase of farmers in the Study Area.

**Remarks**:
-

### Table IV-2 Sub-program Descriptions (3/8)

| | | |
|---|---|---|
| **Title** | **Post-harvest Technology Training for Cash Crop** | **Stage of Gewog**: - |
| **Implementing Organization** | RNR-RC-West | |
| **Agency concerned** | Supported by PHU, AMS and QCS/MOA | |

**Objectives**:
To extent post-harvest processing technology including marketing for horticultural products for reduce losses and improve the quality of products.

**Input**:
1) Inspection instruments such as measuring gages, scales and moisture meter.
2) Participation of foreign experts in charge of training to trainers
a) Training of the following technology to trainers:
- Pre-treatment of shipping, packing, grading, storing and quality control
- Marketing

**Activities**:
1) Fostering trainers for P/H processing and marketing technology.
2) Establishing the training programs in consultation with the PHU, QCS and foreign experts.
3) Carrying out the training to the extension officers (OA) mainly from the Gewogs of stage-3 in the Study Area.

**Expected effects / profits**:
1) Strengthening farmers ability for increasing market value and competitiveness of their products by appropriate P/H processing and treatment.
2) Creation of market oriented activities on farmers.

**Remarks**:
-

### Table IV-2 Sub-program Descriptions (4/8)

| | | |
|---|---|---|
| **Title** | **Agro-Processing Technology Training** | **Stage of Gewog**: - |
| **Implementing Organization** | RNR-RC-West | |
| **Agency concerned** | Supported by Dzongkhag | |

**Objectives**:
To extend marketing and agro-processing technology and foster entrepreneurs for agro-processing business.
To create the incubation place of local agro-processing business and provide training and experimental activities for business development.
To increase opportunity for inhabitants especially "women" to participate the development of agro-processing business and to increase income.

**Input**:
1) Small factory as a training and experimental facility.
A trial sales shop will be attached to it as an annex in the downtown of Mongar.
2) Introduction of a series of simple and small-scale processing equipments such as: cocker, fryer, dryer, roaster, refrigerator, and oven, bottling machine, canning machine and sealer.
3) Participation of foreign experts in charge of training to trainers
a) Training of
- Various processing, management and marketing technology to trainers
b) Dzongkhag office's assistance for acquiring land or a building of an annex in or near the bus terminal in Mongar.

**Activities**:
1) Fostering trainers for agro-processing and marketing technology.
2) Establishing the training programs for various cocking and processing technique and marketing technology, and recruiting trainees mainly housewives and women in the Study Area.
3) Selecting and inviting the dedicated trainees and organizing small groups for experimental and practical agro-processing business activities covering development, processing and marketing of products.
4) Trial production of various new products in addition to local traditional products and selling at the trial sales shop directly to passengers and other people in the downtown.
5) Continuing such trial activities of production and marketing, watching the consumers' response at the trial sales shop and feeding it back to production plan.
6) Expanding production and marketing to town shops and to the other towns for the products having better response from consumers, and supporting and releasing the group to a individual business

| |
|---|
| enterprise or cooperative to manage the business autonomously by themselves. |
| **Expected effects / profits**:<br>1) Demonstration effect of market-oriented products development.<br>2) Introduction of cottage industries in the Study Area.<br>3) Generation of small agro-processing enterprises that will be seeds for development of agro-processing industry in the future. |
| **Remarks**:<br>- |

**Table IV-2 Sub-program Descriptions** (5/8)

| **Title** | **Collection Depot Construction** | **Stage of Gewog**: 1, 2 &3 |
|---|---|---|
| **Implementing Organization** | Dzongkhag Office<br>Managed by Gewog Office after construction | |
| **Agency concerned** | EA | |
| **Objectives**:<br>*To increase opportunity for farmers to meet buyers.* | | |
| **Input**:<br>Material for shed depot | | |
| **Activities**:<br>1) Construction of depots beside the road. | | |
| **Expected effects / profits**:<br>1) More buyers come to buy the products<br>2) Farmers have more opportunity to sell their products. | | |
| **Remarks**:<br>- | | |

**Table IV-2 Sub-program Descriptions** (6/8)

| **Title** | **Group Assembling** | **Stage of Gewog**: 1, 2 &3 |
|---|---|---|
| **Implementing Organization** | Farmers group in the Gewogs of stage 2 and 3, and some of stage 1. | |
| ***Agency concerned*** | *Supervised & supported by Gewog & EA* | |
| **Objectives**:<br>To increase income and stability of sales. | | |
| **Input**:<br>(Using collection depots) | | |
| **Activities**:<br>1) Organizing farmers using the collection depot, and forming the management members among organized farmers.<br>2) Bringing the products to the depot by each member farmer.<br>3) Promotion of the better condition for selling products such as grading and repacking by the management members.<br>4) Carrying out the transaction between buyers and farmers in the depot. | | |
| **Expected effects / profits**:<br>1) Generating bargaining power to buyers.<br>2) Creation of stable marketing condition. | | |
| **Remarks**:<br>- | | |

**Table IV-2 Sub-program Descriptions** (7/8)

| **Title** | **Group Assembling and Marketing** | **Stage of Gewog**: 2 &3 |
|---|---|---|
| **Implementing Organization** | Farmers group in the Gewogs of stage 2 and 3. | |
| **Agency concerned** | Supervised & supported by Gewog, EA, DAO and FCB | |
| **Objectives**:<br>To create the comparative advantage condition of sales and gain more profit. | | |
| **Input**:<br>a) Provision of market information of Mongar market by the DOA and of the auction yard in Samdrup Jongkhar by FCB<br>b) Training of | | |

| |
|---|
| - Management and marketing, and<br>- Information collection and analysis to the management members |
| **Activities**:<br>1) Strengthening ability of the management members above (#2) to carry out the group assembling activities<br>2) Collection and analysis of market information<br>3) Planning of assembling schedule among members<br>4) Grading and repacking of products at the depot.<br>5) Transporting and selling at local markets or at the auction yard in Samdrup Jongkhar.<br>6) Storing some products once and shipping later watching market condition. |
| **Expected effects / profits**:<br>1) Demonstration of market-oriented group activity<br>2) Generating bargaining power to markets<br>3) Possibilities of expanding activities to the fields of agro-processing industry for adding value of products |
| **Remarks**:<br>- |

## Table IV-2 Sub-program Descriptions (8/8)

| | | |
|---|---|---|
| **Title** | **Marketing Support by FCB** | **Stage of Gewog**: - |
| **Implementing Organization** | FCB | |
| **Agency concerned** | Supported by Dzongkhag Office | |
| **Objectives**:<br>To provide option for marketing products by farmer groups<br>To promote the ideal trading condition of export products for farmers through competition among middlemen and transporters. | | |
| **Input**:<br>None | | |
| **Activities**:<br>1) Allocating the staffs for the plan.<br>2) Arrangement of truck for collection of products by request from farmers group.<br>4) Issuance of receipts to representative of farmers group when receiving products.<br>5) Auctioning the collected products at the yard by FCB after coming back to S.J.<br>6) Carrying out cash settlement after deduction of transportation and handling expenditure and commission of 3%. | | |
| **Expected effects / profits**:<br>1) Farmers and farmers' groups will have a new marketing channel by this program.<br>2) Preferable condition for farmers will be expected by the competition among middlemen, FCB and other buyers.<br>3) Farmers and farmers' groups can sell their products at auction yard in S. J. directly even owing the transportation cost. | | |
| **Remarks**:<br>- | | |

## Table IV-3 Implementation Schedule by Gewog

| | | Dev. Stage | Existing | 0<br>2002 | 1<br>2003 | 2<br>2004 | 3<br>2005 | 4<br>2006 | 5<br>2007 | 6<br>2008 | 7<br>2009 | 8<br>2010 | 9<br>2011 | 10<br>2012 | Lack |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lhuntse | ***Gangzur*** | 2 | ◎ | | | - | | | | | | | | | |
| | Jaray | 1 | - | | | | | | | | | | | | x |
| | Khoma | 1 | - | | | | | | | | | | | | x |
| | Kurtoe | 1 | - | | | | | | | ◎ | | | | | |
| | Menbi | 3 | - | | | | ◎ | | | | | | | | |
| | Metsho | 1 | - | | | | | | | | | ◎ | | | |
| | Minjay | 2 | - | | | | ◎ | | | | | | | | |
| | Tsenkhar | 2 | - | | | | | ◎ | | | | | | | |
| Mongar | Balam | 2 | - | | | | | | | | ◎ | | | | |
| | Chali | 2 | - | | | | ◎ | | | | | | | | |
| | ***Chaskhar*** | 3 | - | | | ◎ | | | | | | | | | |
| | Drametse | 2 | ◎ | | | - | | | | | | | | | |
| | ***Drepung*** | 1 | - | | | | | | ◎ | | | | | | |
| | Gongdue | 1 | - | | | | | | | | | | | | x |
| | Jurmey | 1 | - | | | | | | | | | | | | x |
| | Kengkhar | 1 | - | | | | | | | | | | | | x |
| | Mongar | 3 | ◎2 | | | - | | | | | | | | | |
| | Ngatshang | 3 | ◎ | | | | - | | | | | | | | |
| | Saleng | 2 | ◎ | | | | - | | | | | | | | |
| | Sherimuhun | 2 | - | | | | | | | ◎ | | | | | |
| | Silambi | 1 | - | | | | | | | | | | | | x |
| | Thangrong | 1 | - | | | | | ◎ | | | | | | | |
| | Tsakaling | 2 | - | | | | | ◎ | | | | | | | |
| | Tsamang | 2 | - | | | | | | ◎ | | | | | | |
| | Total | | 6 | - | - | 4 (3) | 5 (2) | 3 | 2 | 2 | 1 | - | 1 | - | 18 (5) |
| Marketing Support by FCB | | | | | | | | | | | | | | | |

◎: Construction of collectimg depot

: Group assembling activity

: Group assembling and marketing activity

# Table IV-4 Assembling Plan by Farmers Group in Each Gewog

| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gewog | Item | Unit | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
| Gangzur | Participatory Rate | % | | 20% | 30% | 40% | 50% | 60% | 60% | 60% | 60% | 60% |
| | Vegtable Q'ty | ton | | 31 | 102 | 175 | 257 | 337 | 420 | 506 | 595 | 689 |
| | Fruits Q'ty | ton | | 21 | 34 | 49 | 64 | 81 | 157 | 239 | 329 | 424 |
| | Total | ton | | 52 | 136 | 224 | 322 | 418 | 577 | 745 | 923 | 1,113 |
| | **Assembling Plan** | **ton** | | **10** | **41** | **90** | **161** | **251** | **346** | **447** | **554** | **668** |
| Kurtoe | Participatory Rate | % | | | | | | 20% | 30% | 40% | 50% | 50% |
| | Vegtable Q'ty | ton | | | | | | 50 | 81 | 112 | 145 | 180 |
| | Fruits Q'ty | ton | | | | | | 8 | 12 | 39 | 69 | 102 |
| | Total | ton | | | | | | 59 | 92 | 151 | 214 | 282 |
| | **Assembling Plan** | **ton** | | | | | | **12** | **28** | **61** | **107** | **141** |
| Menbi | Participatory Rate | % | | | 20% | 30% | 40% | 50% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | | 40 | 128 | 214 | 309 | 402 | 505 | 617 | 729 |
| | Fruits Q'ty | ton | | | | | | | 4 | 83 | 170 | 263 |
| | Total | ton | | | 40 | 128 | 214 | 309 | 406 | 588 | 786 | 992 |
| | **Assembling Plan** | **ton** | | | **8** | **38** | **86** | **155** | **203** | **294** | **393** | **496** |
| Metsho | Participatory Rate | % | | | | | | | | 20% | 30% | 40% |
| | Vegtable Q'ty | ton | | | | | | | | 82 | 149 | 220 |
| | Fruits Q'ty | ton | | | | | | | | 77 | 92 | 132 |
| | Total | ton | | | | | | | | 159 | 241 | 352 |
| | **Assembling Plan** | **ton** | | | | | | | | **32** | **72** | **141** |
| Minjay | Participatory Rate | % | | | 20% | 30% | 40% | 50% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | | 0 | 32 | 61 | 91 | 129 | 161 | 201 | 239 |
| | Fruits Q'ty | ton | | | 102 | 125 | 150 | 176 | 204 | 231 | 259 | 289 |
| | Total | ton | | | 102 | 157 | 211 | 268 | 333 | 393 | 461 | 528 |
| | **Assembling Plan** | **ton** | | | **20** | **47** | **84** | **134** | **166** | **196** | **230** | **264** |
| Tsenkhar | Participatory Rate | % | | | | 20% | 30% | 40% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | | | 97 | 139 | 183 | 228 | 270 | 318 | 363 |
| | Fruits Q'ty | ton | | | | 45 | 59 | 75 | 91 | 109 | 178 | 253 |
| | Total | ton | | | | 141 | 198 | 257 | 320 | 379 | 497 | 616 |
| | **Assembling Plan** | **ton** | | | | **28** | **59** | **103** | **160** | **189** | **248** | **308** |
| Balam | Participatory Rate | % | | | | | | | 20% | 30% | 40% | 50% |
| | Vegtable Q'ty | ton | | | | | | | 36 | 78 | 116 | 163 |
| | Fruits Q'ty | ton | | | | | | | 63 | 75 | 87 | 115 |
| | Total | ton | | | | | | | 99 | 152 | 202 | 278 |
| | **Assembling Plan** | **ton** | | | | | | | **20** | **46** | **81** | **139** |
| Chali | Participatory Rate | % | | | 20% | 30% | 40% | 50% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | | 77 | 139 | 197 | 264 | 327 | 398 | 472 | 550 |
| | Fruits Q'ty | ton | | | 97 | 121 | 146 | 173 | 201 | 227 | 255 | 284 |
| | Total | ton | | | 175 | 259 | 343 | 436 | 528 | 625 | 727 | 834 |
| | **Assembling Plan** | **ton** | | | **35** | **78** | **137** | **218** | **264** | **313** | **363** | **417** |
| Chaskhar | Participatory Rate | % | | 20% | 30% | 35% | 40% | 40% | 40% | 40% | 40% | 40% |
| | Vegtable Q'ty | ton | | 104 | 187 | 267 | 356 | 443 | 539 | 690 | 794 | 842 |
| | Fruits Q'ty | ton | | 30 | 48 | 67 | 88 | 110 | 171 | 236 | 307 | 382 |
| | Total | ton | | 134 | 234 | 334 | 444 | 553 | 709 | 926 | 1,100 | 1,224 |
| | **Assembling Plan** | **ton** | | **27** | **70** | **117** | **177** | **221** | **284** | **370** | **440** | **490** |
| Drametse | Participatory Rate | % | | 20% | 30% | 40% | 50% | 50% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | 850 | 917 | 981 | 1,052 | 1,121 | 1,197 | 1,276 | 1,357 | 1,442 |
| | Fruits Q'ty | ton | | 153 | 191 | 232 | 276 | 323 | 383 | 448 | 516 | 588 |
| | Total | ton | | 1,003 | 1,108 | 1,213 | 1,328 | 1,444 | 1,580 | 1,723 | 1,873 | 2,030 |
| | **Assembling Plan** | **ton** | | **201** | **332** | **485** | **664** | **722** | **790** | **862** | **936** | **1,015** |
| Drepong | Participatory Rate | % | | | | | 30% | 40% | 50% | 60% | 70% | 80% |
| | Vegtable Q'ty | ton | | | | | 27 | 67 | 109 | 159 | 210 | 260 |
| | Fruits Q'ty | ton | | | | | 47 | 58 | 70 | 104 | 140 | 179 |
| | Total | ton | | | | | 74 | 126 | 179 | 263 | 351 | 440 |
| | **Assembling Plan** | **ton** | | | | | **22** | **50** | **90** | **158** | **245** | **352** |
| Mongar | Participatory Rate | % | | 20% | 30% | 40% | 50% | 50% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | 464 | 517 | 573 | 636 | 695 | 813 | 884 | 893 | 968 |
| | Fruits Q'ty | ton | | 42 | 50 | 59 | 68 | 77 | 134 | 195 | 261 | 332 |
| | Total | ton | | 506 | 568 | 632 | 704 | 773 | 947 | 1,079 | 1,154 | 1,300 |
| | **Assembling Plan** | **ton** | | **101** | **170** | **253** | **352** | **386** | **474** | **539** | **577** | **650** |
| Ngatshang | Participatory Rate | % | | | 20% | 30% | 40% | 50% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | | 216 | 259 | 309 | 356 | 404 | 454 | 505 | 563 |
| | Fruits Q'ty | ton | | | 80 | 98 | 118 | 140 | 162 | 195 | 229 | 266 |
| | Total | ton | | | 296 | 358 | 428 | 495 | 566 | 649 | 735 | 829 |
| | **Assembling Plan** | **ton** | | | **59** | **107** | **171** | **248** | **283** | **324** | **367** | **415** |
| Saleng | Participatory Rate | % | | | 20% | 30% | 40% | 50% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | | 105 | 146 | 194 | 238 | 284 | 331 | 387 | 440 |
| | Fruits Q'ty | ton | | | 157 | 187 | 220 | 255 | 292 | 314 | 336 | 359 |
| | Total | ton | | | 262 | 333 | 414 | 493 | 576 | 645 | 723 | 799 |
| | **Assembling Plan** | **ton** | | | **52** | **100** | **165** | **246** | **288** | **323** | **361** | **399** |
| Sherimuhung | Participatory Rate | % | | | | | | 20% | 30% | 40% | 50% | 50% |
| | Vegtable Q'ty | ton | | | | | | 101 | 173 | 247 | 324 | 404 |
| | Fruits Q'ty | ton | | | | | | 128 | 151 | 170 | 191 | 213 |
| | Total | ton | | | | | | 229 | 324 | 417 | 514 | 616 |
| | **Assembling Plan** | **ton** | | | | | | **46** | **97** | **167** | **257** | **308** |
| Thangrong | Participatory Rate | % | | | | 20% | 30% | 40% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | | | 24 | 26 | 94 | 171 | 251 | 328 | 411 |
| | Fruits Q'ty | ton | | | | 54 | 67 | 82 | 97 | 114 | 126 | 139 |
| | Total | ton | | | | 78 | 93 | 176 | 268 | 365 | 454 | 550 |
| | **Assembling Plan** | **ton** | | | | **16** | **28** | **70** | **134** | **182** | **227** | **275** |
| Tsakaling | Participatory Rate | % | | | | 20% | 30% | 40% | 50% | 50% | 50% | 50% |
| | Vegtable Q'ty | ton | | | | 0 | 74 | 154 | 233 | 320 | 404 | 697 |
| | Fruits Q'ty | ton | | | | 73 | 91 | 109 | 129 | 178 | 231 | 288 |
| | Total | ton | | | | 73 | 164 | 263 | 361 | 497 | 635 | 985 |
| | **Assembling Plan** | **ton** | | | | **15** | **49** | **105** | **181** | **249** | **318** | **493** |
| **Total Assembling Plan** | | **ton** | | **339** | **788** | **1,373** | **2,157** | **2,967** | **3,806** | **4,751** | **5,779** | **6,969** |

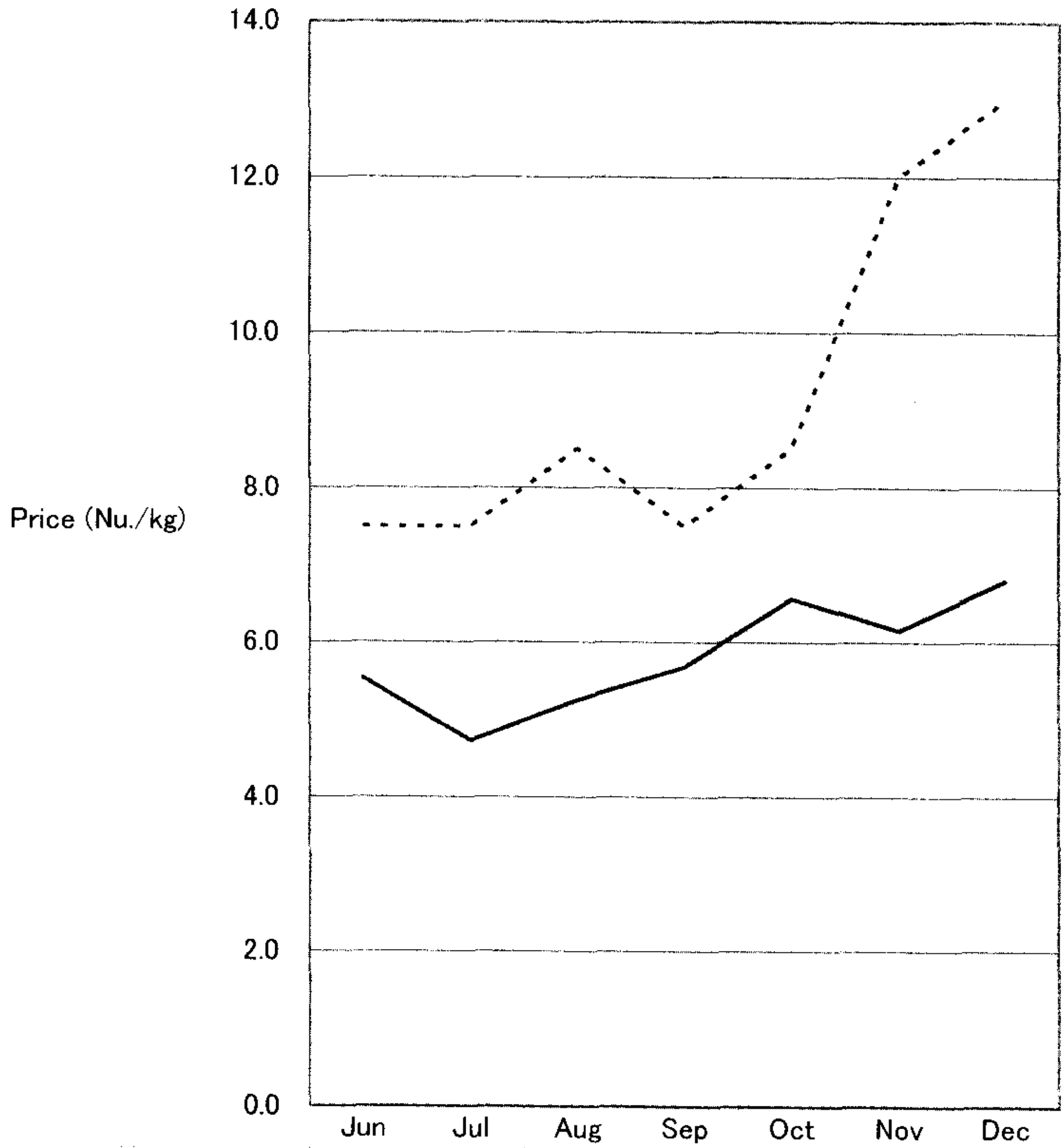
## Table IV-5 Prospects for Distribution and Sales Amount (2012)

| Item | | Lhuntse | Mongar | Total |
|---|---|---|---|---|
| Total Sales Quantity | ton | 2,000 | 5,000 | 7,000 |
| **A. Direct sales** | | | | |
| Sales quantity | ton | 800 | 2,000 | 2,800 |
| Sales amount | Nu. | 4,000,000 | 10,000,000 | 14,000,000 |
| Transportation charge | Nu. | 800,000 | 1,600,000 | 2,400,000 |
| Handling charge | Nu. | 200,000 | 500,000 | 700,000 |
| Servicecharge | Nu. | 120,000 | 300,000 | 420,000 |
| Gross margin | Nu. | 2,880,000 | 7,600,000 | 10,480,000 |
| **B. Sales to middlemen** | | | | |
| Sales quantity | ton | 800 | 2,000 | 2,800 |
| Sales amount at A.Y. | Nu. | 4,000,000 | 10,000,000 | 14,000,000 |
| Transportation charge | Nu. | 800,000 | 1,600,000 | 2,400,000 |
| Handling charge | Nu. | 200,000 | 500,000 | 700,000 |
| Servicecharge | Nu. | 120,000 | 300,000 | 420,000 |
| Balance | Nu. | 2,880,000 | 7,600,000 | 10,480,000 |
| Middlemen margen | Nu. | 288,000 | 760,000 | 1,048,000 |
| Gross margin = Sales Amn't | Nu. | 2,592,000 | 6,840,000 | 9,432,000 |
| **C. FCB's service** | | | | |
| *Sales quantity* | *ton* | *400* | *1,000* | *1,400* |
| Sales amount | Nu. | 2,000,000 | 5,000,000 | 7,000,000 |
| *Transportation charge* | *Nu.* | *400,000* | *800,000* | *1,200,000* |
| Handling charge | Nu. | 100,000 | 250,000 | 350,000 |
| Servicecharge | Nu. | 60,000 | 150,000 | 210,000 |
| Gross margin | Nu. | 1,440,000 | 3,800,000 | 5,240,000 |
| Total | | | | |
| Sales amount | Nu. | 8,592,000 | 21,840,000 | 30,432,000 |
| Gross margin | Nu. | 6,912,000 | 18,240,000 | 25,152,000 |

## Table IV-6 Prospects of Sales Amount by Household and Gewog

| | Gewog | Population | Household | Participation | | Sales | | | Gross Margin | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (%) | (H.H.) | (ton) | (Nu.) | (Nu./H.H.) | (Nu.) | (Nu./H.H.) |
| Lhuntse | Gangzur | 3,487 | 459 | 60 | 275 | 668 | 2,844,131 | 10,327 | 2,288,016 | 8,308 |
| | Kurtoe | 1,692 | 200 | 50 | 100 | 141 | 600,333 | 6,003 | 482,949 | 4,829 |
| | *Menbi* | 3,142 | 405 | 50 | 203 | 496 | 2,111,810 | 10,429 | 1,698,886 | 8,390 |
| | Metsho | 2,142 | 244 | 40 | 98 | 141 | 600,333 | 6,151 | 482,949 | 4,948 |
| | Minjay | 2,219 | 266 | 50 | 133 | 264 | 1,124,028 | 8,451 | 904,246 | 6,799 |
| | Tsenkhar | 2,984 | 403 | 50 | 202 | 308 | 1,311,366 | 6,508 | 1,054,953 | 5,236 |
| | Total | 15,666 | 1,977 | | 1,010 | 2,018 | 8,592,000 | 8,507 | 6,912,000 | 6,844 |
| Mongar | Balam | 1,614 | 181 | 50 | 91 | 139 | 612,913 | 6,773 | 511,884 | 5,656 |
| | Chali | 1,952 | 262 | 50 | 131 | 417 | 1,838,740 | 14,036 | 1,535,651 | 11,723 |
| | Chaskhar | 3,095 | 401 | 40 | 160 | 490 | 2,160,630 | 13,470 | 1,804,482 | 11,250 |
| | Drametse | 4,734 | 534 | 50 | 267 | 1,015 | 4,475,591 | 16,763 | 3,737,856 | 13,999 |
| | Drepong | 1,733 | 217 | 80 | 174 | 352 | 1,552,126 | 8,941 | 1,296,281 | 7,467 |
| | Mongar | 4,544 | 461 | 50 | 231 | 650 | 2,866,142 | 12,434 | 2,393,701 | 10,385 |
| | Ngatshang | 2,615 | 268 | 50 | 134 | 415 | 1,829,921 | 13,656 | 1,528,286 | 11,405 |
| | Saleng | 2,718 | 293 | 50 | 147 | 399 | 1,759,370 | 12,009 | 1,469,364 | 10,030 |
| | Serimuhung | 2,593 | 269 | 50 | 135 | 308 | 1,358,110 | 10,097 | 1,134,246 | 8,433 |
| | Thangrong | 2,228 | 274 | 50 | 137 | 275 | 1,212,598 | 8,851 | 1,012,720 | 7,392 |
| | Tsakaling | 3,132 | 332 | 50 | 166 | 493 | 2,173,858 | 13,096 | 1,815,530 | 10,937 |
| | Total | 30,958 | 3,492 | | 1,771 | 4,953 | 21,840,000 | 12,332 | 18,240,000 | 10,299 |
| | G.total | 46,624 | 5,469 | | 2,781 | 6,971 | 30,432,000 | 10,943 | 25,152,000 | 9,044 |

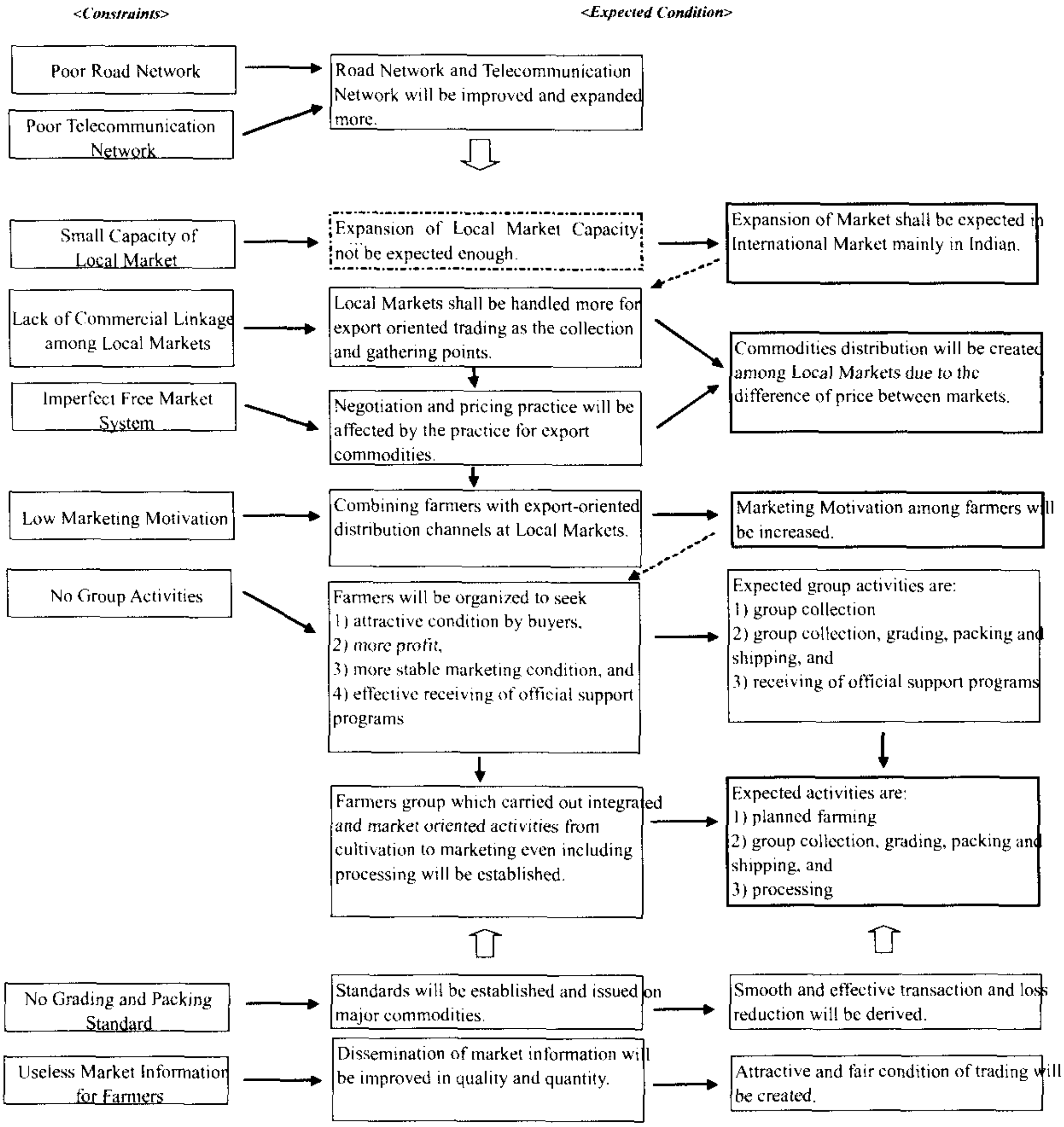
# *Figures*



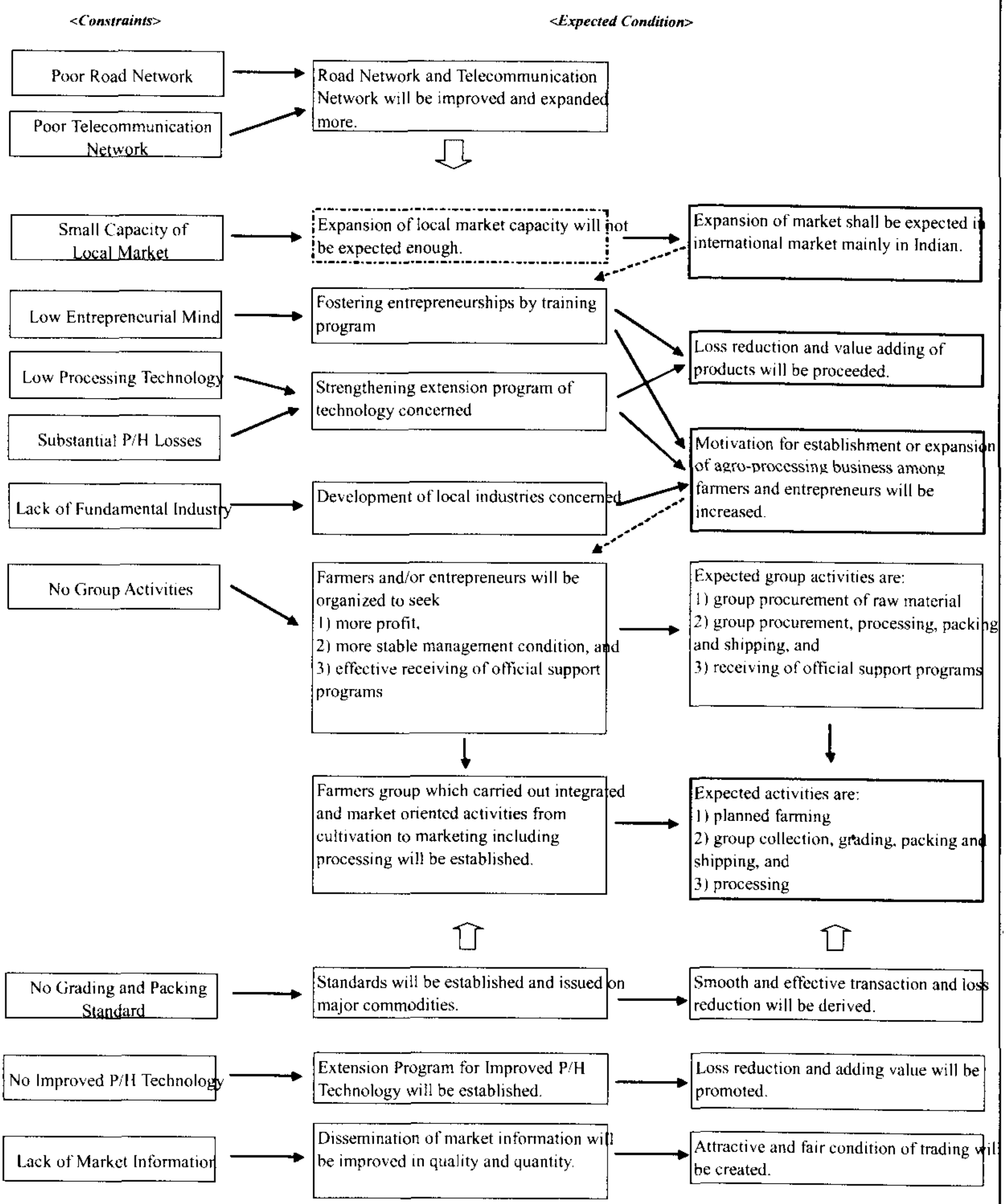

| | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|
| ——— Auction Yard at Samdrup Jongkhar | 5.5 | 4.7 | 5.3 | 5.7 | 6.6 | 6.1 | 6.8 |
| - - - - - Mongar | 7.5 | 7.5 | 8.5 | 7.5 | 8.5 | 12.0 | 13.0 |

Source: FCB and AMS/PPD

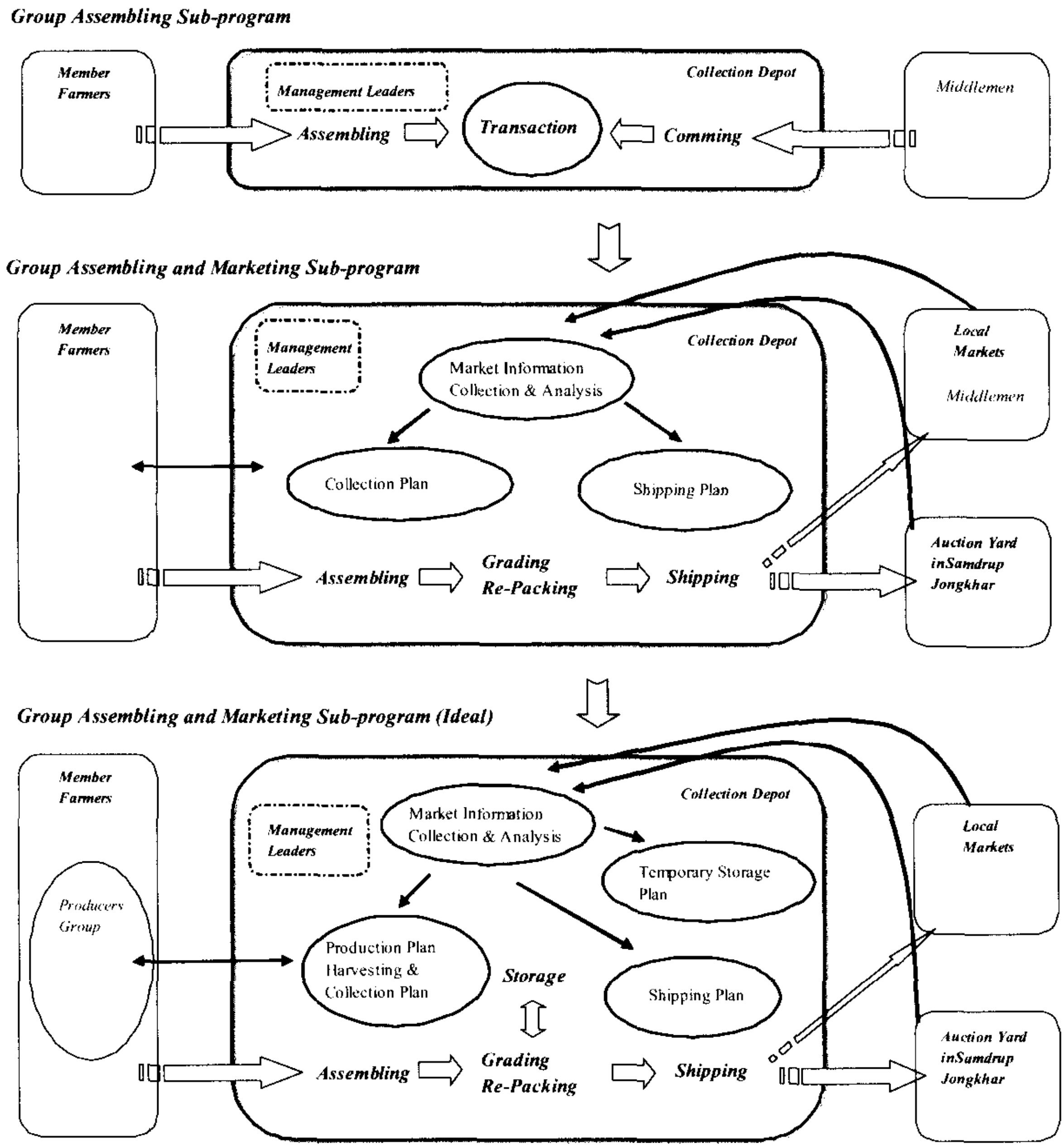
| | |
|---|---|
| The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan | Figure IV-1<br><br>Potato Price in Mongar Market and Auction Yard of Samdrup Jongkhar |
| Japan International Cooperation Agency (JICA) | |




| The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan | Figure IV-2<br><br>Expected Condition for Development in Marketing Field |
|---|---|
| Japan International Cooperation Agency (JICA) | |




| | |
|---|---|
| The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan | Figure IV-3<br><br>Expected Condition for Development in Agro-processing Field |
| Japan International Cooperation Agency (JICA) | |




| | |
|---|---|
| The Study on Agriculture and Farm Road Development in the Lhuntse and Mongar Districts in the Kingdom of Bhutan | Figure IV-4<br><br>Activity Flow of Group Assembling (and Marketing) Sub-program |
| Japan International Cooperation Agency (JICA) | |