

Annexes

The power absorbed by a cultivation implement, or any machine, is a combination of the force required and the speed at which it is propelled.

The unit of force is the Newton (N), approximately equal to 0.10 kilogram force (kgf). Because 1 Newton is so small, forces on cultivation equipment are usually expressed in kilonewtons (kN). The unit of power is Watt (W), and values are usually expressed in kilowatts (kW). Speed is measured in metres per second (m/s) and the relationship of these three components is as follows:

Power = force x speed

i.e. $W = N \text{ m/s}$

or $kW = kN \text{ m/s}$

Although the power output of animals was traditionally often quoted in horsepower (hp) (one of the most usual power units), force in pounds and distance in feet, the metric system is preferred for scientific work (1 kW = 1.34 hp)

Annex 1

Calculation and Measurement of Power Output

The power absorbed by a cultivation implement, or any machine, is a combination of the force required and the speed at which it is propelled.

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$$\text{Power} = \text{force} \times \text{speed}$$

$$\text{i.e., } W = N \text{ m/s}$$

$$\text{or } kW = kN \text{ m/s.}$$

Although the power output of animals was traditionally often quoted in horsepower (hp) (one of the most usual power units), force in pounds and distance in feet, the metric system is preferred for scientific work (1 kW = 1.34 hp)

For animal draught equipment, the force recorded in the draught line depends on the angle of the draught line to the working plane. The power applied is related to the force in the direction of travel and that is in a line parallel to the ground.

Using Figure 1 the actual force can be calculated from the recorded force and harness dimensions and inserted into the power equation when:

- H = the height of the attachment to the yoke (m),
- h = the working height of the implement hitch (m),
- L = the length between the hitch and yoke (m),
- R_f = the recorded draught force (kN), and
- AF = the actual draught force (kN).

The pictorial layout of the implement and harness in Figure 1 is interpreted in Figure 1 as the forces acting on the hitch point when the implement is travelling in a steady state.

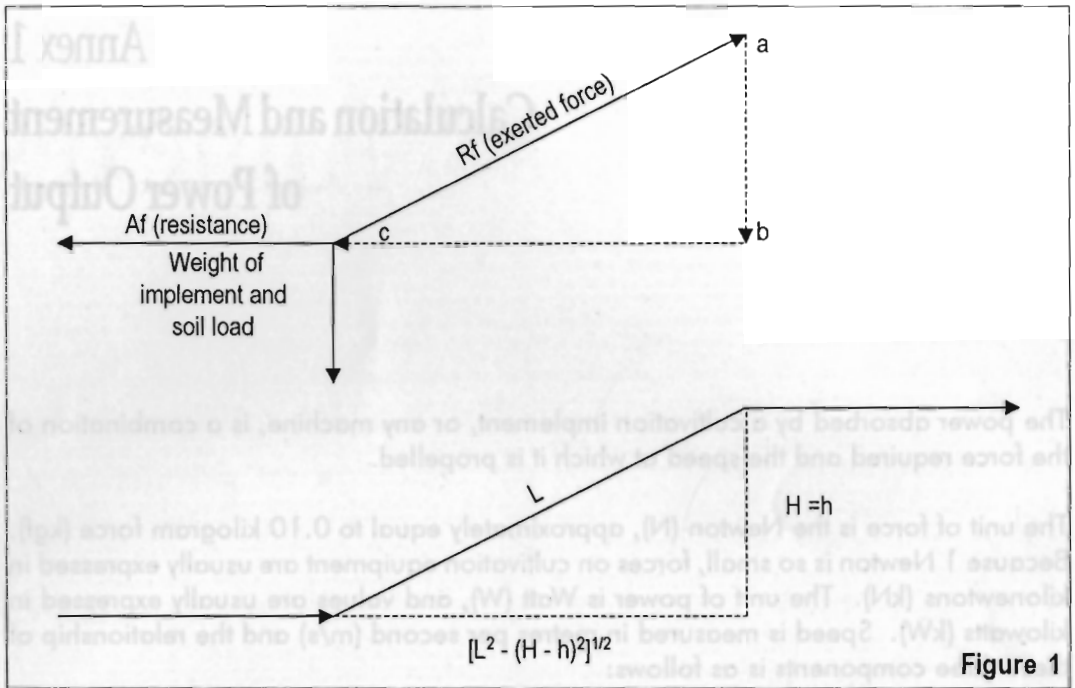


Figure 1

Distance *ab* is equivalent to the weight and soil load on the implement and distance *bc* is equivalent to the resistance of the implement, which is equal to the net draught force (actual force).

The geometric layout of the harness as shown in the Figure and because the two diagrams in the Figure represent "similar triangles",

$$Rf/AF = L / [L^2 - (H - h)^2]^{1/2}$$

and, therefore,

$$AF = Rf [L^2 - (H - h)^2]^{1/2} / L$$

when *d* is the distance travelled (m) and *t* is the time taken (seconds), the power equation becomes

$$kW = Rf [[L^2 - (H - h)^2]^{1/2} / L] d / t.$$

The sum inside the brackets becomes a constant for any single animal/implement combination.

The power output for each work period will be calculated as power x lapsed time and expressed in kilowatt hours (kWh).

[Source : Matthews 1987]

Annex 4: Number of Holdings under Different Farm Categories

| Farm Category | Shivaliks | | | Middle Himalayas: Traditional | | | Middle Himalayas: Transformed | | | Greater Himalayas | | | | | |
|--------------------|-----------------|----------------|-----------------|-------------------------------|----------------|-----------------|-------------------------------|----------------|-----------------|-------------------|----------------|-----------------|----------------|----------------|-----------------|
| | Ganga Bhogpur | Khand Gaon | Naigath | Taily Sunoli | Goom | Banali | Per Village | Suni | Kandhia Badathi | haupaia Gaon | Per Village | Bagauri | Juma | Gangi | Per Village |
| Landless | - | - | - | - | - | - | - | - | - | - | - | 60 [25.00] | - | - | 20 [16.67] |
| Marginal <= 0.5 ha | 90 [40.00] | - | 255 [51.00] | 48 [64.00] | - | 30 [13.64] | 26 [23.01] | 4 [18.18] | 10 [16.13] | 60 [42.86] | 25 [33.33] | 180 [75.00] | 20 [66.67] | 12 [13.33] | 71 [59.17] |
| Small <= 1.0 ha | 106 [47.11] | - | 222 [44.40] | 20 [26.67] | 2 [4.44] | 130 [59.09] | 50 [44.25] | 14 [63.64] | 16 [25.81] | 40 [28.57] | 23 [30.67] | - | 6 [20.00] | 8 [8.89] | 5 [4.17] |
| Medium <= 2.0 ha | 23 [10.22] | - | 20 [4.00] | 7 [9.33] | 30 [66.67] | 55 [25.00] | 31 [27.43] | 3 [13.64] | 31 [50.00] | 20 [14.29] | 18 [24.00] | - | 4 [13.33] | 60 [66.67] | 21 [17.50] |
| Large > 2.0 ha | 6 [2.67] | 90 [100.00] | 3 [0.60] | - | 13 [28.89] | 5 [2.27] | 6 [5.31] | 1 [4.55] | 5 [8.06] | 20 [14.29] | 9 [12.00] | - | - | 10 [11.11] | 3 [2.50] |
| Total Holdings | 225 [100.00] | 90 [100.00] | 500 [100.00] | 75 [100.00] | 45 [100.00] | 220 [100.00] | 113 [100.00] | 22 [100.00] | 62 [100.00] | 140 [100.00] | 75 [100.00] | 240 [100.00] | 30 [100.00] | 90 [100.00] | 120 [100.00] |

Figures in parentheses are percentages of total holdings.

Annex 5: Cropland Area (ha) under Different Landholding Categories

| Landholding Category | Shivaliks | | | Middle Himalayas: Traditional | | | Middle Himalayas: Transformed | | | Greater Himalayas | | | | | |
|----------------------|--------------------|--------------------|--------------------|-------------------------------|-------------------|--------------------|-------------------------------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | Ganga Bhogpur | Khand Gaon | Naigath | Taily Sunoli | Goom | Banali | Per Village | Suni | Kandhia Badathi | haupaia Gaon | Per Village | Bagauri | Juma | Gangi | Per Village |
| Landless | - | - | - | - | - | - | - | - | - | - | - | 0.00 | - | - | - |
| Marginal | 20.64 [16.25] | - | 97.06 [35.95] | 21.12 [40.62] | - | 8.00 [3.70] | 9.71 [8.21] | 1.88 [8.95] | 4.20 [5.38] | 12.00 [11.43] | 6.03 [8.87] | 25.00 [100.00] | 4.04 [31.08] | 3.84 [4.17] | 10.96 [25.29] |
| Small | 63.38 [49.91] | - | 122.54 [45.19] | 17.00 [32.69] | 1.68 [1.93] | 104.00 [48.15] | 40.88 [34.56] | 11.22 [53.43] | 14.40 [18.46] | 26.20 [24.95] | 17.27 [25.40] | - | 3.36 [25.85] | 4.16 [4.52] | 2.51 [5.77] |
| Medium | 29.90 [23.54] | - | 36.00 [13.33] | 13.88 [26.69] | 48.00 [55.17] | 93.50 [43.29] | 51.79 [43.77] | 5.40 [26.71] | 48.80 [62.56] | 25.00 [23.81] | 26.40 [38.82] | - | 5.60 [43.08] | 63.00 [68.48] | 22.87 [52.78] |
| Large | 13.08 [10.30] | 288.00 [100.00] | 14.40 [5.33] | - | 37.32 [42.90] | 10.50 [4.86] | 15.94 [13.47] | 2.50 [11.90] | 10.60 [13.59] | 41.80 [39.81] | 18.30 [26.91] | - | - | 21.00 [22.83] | 7.00 [16.16] |
| Overall | 127.00 [100.00] | 298.00 [100.00] | 270.00 [100.00] | 52.00 [100.00] | 87.00 [100.00] | 216.00 [100.00] | 118.33 [100.00] | 21.00 [100.00] | 78.00 [100.00] | 105.00 [100.00] | 68.00 [100.00] | 25.00 [100.00] | 13.00 [100.00] | 92.00 [100.00] | 43.33 [100.00] |

Figures in parentheses are percentages of the total area.

Annex 6: Landholding Size (ha) under Different Landholding Categories

| Landholding Category | Shivaliks | | | Middle Himalayas: Traditional | | | Middle Himalayas: Transformed | | | Greater Himalayas | | | |
|----------------------|---------------|------------|---------------------|-------------------------------|------|--------------------|-------------------------------|-----------------|------------------|-------------------|-------------------|------|-------------------|
| | Ganga Bhogpur | Khand Gaon | Naigoth Per Village | Taily Sundli | Goom | Banali Per Village | Sun | Kandhla Bacethi | Chaupariyal Gaon | Per Village | Bagauri | Juma | Gangi Per Village |
| Marginal | 0.23 | - | 0.38 | 0.44 | - | 0.27 | 0.47 | 0.42 | 0.20 | 0.24 | 0.14 | 0.20 | 0.32 |
| Small | 0.60 | - | 0.55 | 0.85 | 0.84 | 0.80 | 0.80 | 0.90 | 0.65 | 0.75 | - | 0.56 | 0.52 |
| Medium | 1.30 | - | 1.80 | 1.99 | 1.60 | 1.70 | 1.80 | 1.57 | 1.25 | 1.47 | - | 1.40 | 1.05 |
| Large | 2.18 | 3.20 | 4.80 | - | 2.87 | 2.10 | 2.50 | 2.12 | 2.09 | 2.03 | - | - | 2.10 |
| Overall | 0.56 | 3.20 | 0.54 | 0.69 | 1.93 | 0.98 | 0.95 | 1.25 | 0.75 | 0.91 | 0.10 ^a | 0.43 | 1.02 |

^a Average includes 60 landless families.

^b Average includes 20 landless families.

Annex 7: Crop Area (ha) of all Households and its Distribution as a Percentage of Cultivated Area in the Shivailik Villages

| Crops | Ganga Bhagpur | | | Khandgacch | | | Naigoth | | | Per Village | | |
|-----------------------|---------------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|
| | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area |
| Summer Crops | | | | | | | | | | | | |
| Upland Rice | 0.00 | 0.00 | 0.00 | 0.00 | 32.80 | 6.38 | 10.93 | 2.45 | | | | |
| Lowland Rice | 64.93 | 26.22 | 273.60 | 47.50 | 77.50 | 15.07 | 138.68 | 31.10 | | | | |
| Maize | 44.62 | 18.02 | 0.00 | 0.00 | 51.36 | 9.99 | 31.99 | 7.17 | | | | |
| Oilseeds | 3.18 | 1.28 | 0.00 | 0.00 | 35.64 | 6.93 | 12.94 | 2.90 | | | | |
| Pulses | 3.18 | 1.28 | 7.20 | 1.25 | 60.20 | 11.70 | 23.53 | 5.28 | | | | |
| Vegetables | 4.91 | 1.98 | 4.32 | 0.75 | 12.50 | 2.43 | 7.24 | 1.62 | | | | |
| Fodder | 6.18 | 2.50 | 2.88 | 0.50 | 0.00 | 0.00 | 3.02 | 0.68 | | | | |
| Winter Crops | | | | | | | | | | | | |
| Upland Wheat | 0.00 | 0.00 | 0.00 | 0.00 | 125.00 | 24.30 | 41.67 | 9.34 | | | | |
| Lowland Wheat | 97.96 | 39.56 | 259.20 | 45.00 | 70.00 | 13.61 | 142.38 | 31.93 | | | | |
| Barley | 2.54 | 1.03 | 0.00 | 0.00 | 8.00 | 1.56 | 3.51 | 0.79 | | | | |
| Pulses | 12.54 | 5.06 | 0.00 | 0.00 | 10.00 | 1.94 | 7.51 | 1.68 | | | | |
| Oilseeds | 3.18 | 1.28 | 17.28 | 3.00 | 19.32 | 3.76 | 13.26 | 2.97 | | | | |
| Vegetables | 3.18 | 1.28 | 8.64 | 1.50 | 12.00 | 2.33 | 7.94 | 1.78 | | | | |
| Fodder | 1.27 | 0.51 | 2.88 | 0.50 | 0.00 | 0.00 | 1.38 | 0.31 | | | | |
| Total Cultivated Area | 247.66 | 100.00 | 576.00 | 100.00 | 514.32 | 100.00 | 445.99 | 100.00 | | | | |
| Total Cropland | 127.00 | - | 288.00 | - | 270.00 | - | 228.33 | - | | | | |
| Cropping Intensity | 195.01 | - | 200.00 | - | 19.49 | - | 195.32 | - | | | | |

Annex 8: Crop Area (ha) of all Households and its Distribution as a Percentage of Cultivated Areas in the Middle Himalayan (traditional)

| Crops | Tally Sundi | | | Goom | | | Banai | | | Per Village | | |
|-------------------------|-------------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|
| | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area |
| Summer Crops | | | | | | | | | | | | |
| Upland Rice | 10.40 | 12.50 | 21.75 | 16.67 | 38.88 | 11.25 | 23.68 | 12.70 | | | | |
| Finger Millet + Pulses* | 20.80 | 25.00 | 43.50 | 33.33 | 86.40 | 25.00 | 50.23 | 26.96 | | | | |
| Barnard Millet | 20.80 | 25.00 | 21.75 | 16.67 | 82.02 | 23.74 | 41.52 | 22.27 | | | | |
| Amaranth** | 0.00 | 0.00 | 0.00 | 0.00 | 8.64 | 2.50 | 2.88 | 1.54 | | | | |
| Winter Crops | | | | | | | | | | | | |
| Upland Wheat*** | 28.60 | 34.38 | 40.00 | 30.66 | 118.00 | 34.15 | 62.20 | 33.37 | | | | |
| Barley | 2.60 | 3.13 | 3.50 | 2.66 | 11.60 | 3.36 | 5.90 | 3.17 | | | | |
| Total Cultivated Area | 83.20 | 100.00 | 130.50 | 100.00 | 345.54 | 100.00 | 186.41 | 100.00 | | | | |
| Total Cropland | 52.00 | - | 87.00 | - | 216.00 | - | 118.33 | - | | | | |
| Cropping Intensity | 160.00 | - | 150.00 | - | 159.97 | - | 157.53 | - | | | | |

* Finger millet is usually raised with pulses and pseudocereals. Various pulses are: Horsegram, Blackgram, Greengram, Black soyabean, Groundnut (only in Tally Sundi villages), Frenchbean, Ricebean etc. Pseudocereals Amaranth and Buckwheat are also raised with Finger Millet.

** Amaranth is usually intercropped with Kidney bean.

*** Nearly 50 per cent wheat is intercropped with Lentil and Rapeseed/Mustard.

Annex 9: Crop Area (ha) of all Households and Its Distribution as a Percentage of Cultivated Area in the Middle Himalayan Transformed Villages

| Crops | Sun | | | Kandla Baddhi | | | Chrapanya goons | | | Per Village | | |
|-------------------------|-----------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|-----------------|-------------------------------|-----------|-------------------------------|-----------|-------------------------------|
| | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area | Crop Area | Percentage of Cultivated Area |
| Summer Crops | | | | | | | | | | | | |
| Upland Rice | 0.68 | 1.68 | 4.50 | 2.88 | 1.60 | 0.95 | 1.60 | 0.95 | 2.26 | 1.86 | 2.26 | 1.86 |
| Lowland Rice | 5.00 | 12.38 | 30.00 | 19.23 | 0.00 | 0.00 | 0.00 | 0.00 | 11.67 | 9.59 | 11.67 | 9.59 |
| Finger Millets + Pulses | 1.60 | 3.95 | 8.50 | 5.45 | 8.67 | 5.14 | 8.67 | 5.14 | 6.26 | 5.14 | 6.26 | 5.14 |
| Barley and Millet | 0.00 | 0.00 | 11.00 | 7.05 | 12.00 | 7.11 | 12.00 | 7.11 | 7.67 | 6.30 | 7.67 | 6.30 |
| Soyabean | 3.72* | 9.21 | 6.00 | 3.85 | 2.40 | 1.42 | 2.40 | 1.42 | 4.04 | 3.32 | 4.04 | 3.32 |
| Oilseeds | 0.00 | 0.00 | 2.00 | 1.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.55 | 0.67 | 0.55 |
| Vegetables | 10.00 | 24.75 | 16.00 | 10.26 | 80.33** | 47.58 | 80.33** | 47.58 | 35.44 | 29.11 | 35.44 | 29.11 |
| Winter Crops | | | | | | | | | | | | |
| Upland Wheat | 3.96 | 9.80 | 22.50 | 14.42 | 16.33 | 9.67 | 16.33 | 9.67 | 14.26 | 11.71 | 14.26 | 11.71 |
| Lowland Wheat | 5.00 | 12.38 | 30.50 | 19.56 | 0.00 | 0.00 | 0.00 | 0.00 | 11.63 | 9.72 | 11.63 | 9.72 |
| Pulses | 0.00 | 0.00 | 3.50 | 2.24 | 3.75 | 2.22 | 3.75 | 2.22 | 2.42 | 1.99 | 2.42 | 1.99 |
| Oilseeds | 0.44 | 1.09 | 6.00 | 3.85 | 3.75 | 2.22 | 3.75 | 2.22 | 3.40 | 2.79 | 3.40 | 2.79 |
| Vegetables | 10.00 | 24.75 | 15.50 | 9.94 | 40.00*** | 23.69 | 40.00*** | 23.69 | 21.63 | 17.93 | 21.63 | 17.93 |
| Total Cultivated Area | 40.40 | 100.00 | 156.00 | 100 | 168.83 | 100 | 168.83 | 100 | 121.75 | 100.00 | 121.75 | 100.00 |
| Total Cropland | 21.00 | - | 78.00 | - | 105.00 | - | 105.00 | - | 68.00 | - | 68.00 | - |
| Cropping Intensity | 192.38 | - | 200.00 | - | 160.79 | - | 160.79 | - | 179.04 | - | 179.04 | - |

* About one-third are inter-cropped with sesame.

** 65 ha area under Apple Orchards is included.

*** 32.5 ha area under vegetables lie in Apple Orchards.

Annex 10: Crop Area (ha) of all Households and Its Distribution as a Percentage of Cultivated Area in the Greater Himalayan Villages

| Crops | Bagaun | | | Juma | | | Gangi | | | Per Village | | |
|-----------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|-----------------------------|
| | Crop Area | Per cent of Cultivated Area | Crop Area | Per cent of Cultivated Area | Crop Area | Per cent of Cultivated Area | Crop Area | Per cent of Cultivated Area | Crop Area | Per cent of Cultivated Area | Crop Area | Per cent of Cultivated Area |
| Summer Crops | | | | | | | | | | | | |
| Amaranth | 5.00 | 22.20 | 1.30 | 10.00 | 25.00 | 29.67 | 25.00 | 29.67 | 10.43 | 26.13 | 10.43 | 26.13 |
| Buckwheat | 2.50 | 11.11 | 2.60 | 20.00 | 7.50 | 8.90 | 7.50 | 8.90 | 4.20 | 10.52 | 4.20 | 10.52 |
| Kidney Bean | 10.00 | 44.44 | 2.60 | 20.00 | 2.50 | 2.97 | 2.50 | 2.97 | 5.03 | 12.60 | 5.03 | 12.60 |
| Poleab | 5.00 | 22.22 | 2.60 | 20.00 | 22.00 | 26.11 | 22.00 | 26.11 | 9.67 | 24.73 | 9.67 | 24.73 |
| Winter Crops | | | | | | | | | | | | |
| Wheat | 0.00 | 0.00 | 0.00 | 0.00 | 27.25 | 32.34 | 27.25 | 32.34 | 9.08 | 22.75 | 9.08 | 22.75 |
| Naked Barley | 0.00 | 0.00 | 3.90 | 30.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.30 | 3.26 | 1.30 | 3.26 |
| Total Cultivated Area | 22.50 | 100.00 | 13.00 | 100.00 | 84.25 | 100.00 | 84.25 | 100.00 | 39.91 | 100.00 | 39.91 | 100.00 |
| Total Cropland | 25.00 | - | 13.00 | - | 92.00 | - | 92.00 | - | 43.33 | - | 43.33 | - |
| Cropping Intensity | 90.00 | - | 100.00 | - | 91.58 | - | 91.58 | - | 92.11 | - | 92.11 | - |

* Some minor crops such as millet and fox tail millet have not been included. They are often intercropped with major crops shown above.

Annex 11: Average Productivity (q/ha) of Different Crops at Study Sites

| Crops | Shivaliks | | Middle Himalaya : Traditional | | Middle Himalaya : Transformed | | Greater Himalaya | |
|------------------------|-----------|-----|----------------------------------|------|----------------------------------|------|------------------|----|
| | MP | BP | MP | BP | MP | BP | MP | BP |
| Upland Rice | 22 | 26 | 25 | 32 | 23 | 29 | - | - |
| Lowland Rice | 32 | 41 | - | - | 33 | 44 | - | - |
| Maize | 20 | 60 | - | - | - | - | - | - |
| Summer Oilseeds | 3 | - | - | - | 2 | - | - | - |
| Summer Pulses | 10 | 10 | - | - | - | - | - | - |
| Finger Millet + Pulses | - | - | 14+6 | 28+6 | 14+6 | 28+6 | - | - |
| Barnyard Millet | - | - | 13 | 36 | 13 | 36 | - | - |
| Amaranth + Kidney bean | - | - | 12+6 | +9 | - | - | - | - |
| Soyabean | - | - | - | - | 18 | - | - | - |
| Summer Vegetables | 48+30 | - | - | - | 55+80 | - | - | - |
| Summer Fodder | - | 300 | - | - | - | - | - | - |
| Amaranth | - | - | - | - | - | - | 16 | - |
| Buckwheat | - | - | - | - | - | - | 11 | - |
| Kidneybean | - | - | - | - | - | - | 18 | 27 |
| Potato | - | - | - | - | - | - | 59 | - |
| Upland Wheat | 20 | 28 | 21 | 28 | 21 | 28 | 14 | 21 |
| Lowland Wheat | 35 | 48 | - | - | 35 | 48 | - | - |
| Barley | 18 | 27 | 16 | 24 | - | - | - | - |
| Naked Barley | - | - | - | - | - | - | 12 | 18 |
| Winter Pulses | 9 | 9 | - | - | 10 | 10 | - | - |
| Winter Oilseeds | 6 | - | - | - | 5 | - | - | - |
| Winter Vegetables | 50+40 | - | - | - | 58+80 | - | - | - |
| Winter Fodder | - | 250 | - | - | - | - | - | - |

Note : MP = Main Product, BP = By- Product

The main vegetables include potatoes and other vegetables, eg. peas, french beans, cabbage, etc.

In the Greater Himalayas, only potato cultivation is practised.

Annex 12: Distribution of Bullock Population among Different Landholding Categories

| Landholding Category | Shivaliks | | | Middle Himalayas: Traditional | | | Middle Himalayas: Transformed | | | Greater Himalayas | | |
|----------------------|---------------|------------|----------|-------------------------------|----------|----------|-------------------------------|-----------------|------------------|-------------------|----------|----------|
| | Ganga Bhogpur | Khand Gaon | Naigoth | Taily Sunoli | Goom | Banali | Suri | Kandhia Badethi | Chaupariyal Gaon | Bagauri | Juma | Gangi |
| Landless | - | - | - | - | - | - | - | - | - | 0 | - | - |
| | - | - | - | - | - | - | - | - | - | [0.00] | - | - |
| Marginal | 33 | - | 198 | 68 | - | 50 | 2 | 2 | 30 | 0 | 8 | 8 |
| | [20.63] | - | [49.50] | [50.75] | - | [8.33] | [6.25] | [5.00] | [18.75] | [0.00] | [33.33] | [5.33] |
| Small | 95 | - | 156 | 48 | 0 | 275 | 20 | 10 | 44 | - | 8 | 12 |
| | [59.38] | - | [39.00] | [35.82] | [0.00] | [45.83] | [62.50] | [25.00] | [27.50] | - | [33.33] | [8.00] |
| Medium | 30 | - | 40 | 18 | 4 | 255 | 8 | 22 | 46 | - | 8 | 110 |
| | [18.75] | - | [10.00] | [13.43] | [18.18] | [42.50] | [25.00] | [55.00] | [28.75] | - | [33.33] | [73.33] |
| Large | 2 | 40 | 6 | - | 18 | 20 | 2 | 6 | 40 | - | - | 20 |
| | [1.25] | [100.00] | [1.50] | - | [81.82] | [3.33] | [6.25] | [15.00] | [25.00] | - | - | [13.33] |
| Overall | 160 | 40 | 400 | 134 | 22 | 600 | 32 | 40 | 160 | 0 | 24 | 150 |
| | [100.00] | [100.00] | [100.00] | [100.00] | [100.00] | [100.00] | [100.00] | [100.00] | [100.00] | [0.00] | [100.00] | [100.00] |

Figures in parentheses are percentages of the overall bullock population in a village.

A negative (-) sign denotes non-existence of the category.

Annex 13: Bullock Holding Sizes among Different Categories

| Landholding Category | Shivaliks | | | Middle Himalayas: Traditional | | | Middle Himalayas: Transformed | | | Greater Himalayas | | |
|----------------------|---------------|------------|---------|-------------------------------|------|--------|-------------------------------|-----------------|------------------|-------------------|------|-------|
| | Ganga Bhogpur | Khand Gaon | Naigoth | Taily Sunoli | Goom | Banali | Suri | Kandhia Badethi | Chaupariyal Gaon | Bagauri | Juma | Gangi |
| Landless | - | - | - | - | - | - | - | - | - | 0.00 | - | - |
| Marginal | 0.37 | - | 0.78 | 1.42 | - | 1.67 | 0.50 | 0.20 | 0.50 | 0.00 | 0.40 | 0.67 |
| Small | 0.90 | - | 0.70 | 2.40 | 0.00 | 2.12 | 1.43 | 0.63 | 1.10 | - | 1.33 | 1.50 |
| Medium | 1.30 | - | 2.00 | 2.57 | 0.13 | 4.64 | 2.67 | 0.71 | 2.30 | - | 2.00 | 1.83 |
| Large | 0.33 | 0.44 | 2.00 | - | 1.38 | 4.00 | 2.00 | 1.20 | 2.00 | - | - | 2.00 |
| Average | 0.71 | 0.44 | 0.80 | 1.79 | 0.49 | 2.73 | 1.45 | 0.65 | 1.14 | 0.00 | 0.80 | 1.67 |

Annex 14: Bullock Density on Cropland Area (No. Per ha) among Different Landholding Categories

| Landholding Category | Shivaliks | | | Middle Himalayas: Traditional | | | Middle Himalayas: Transformed | | | Greater Himalayas | | |
|----------------------|---------------|------------|---------|-------------------------------|------|--------|-------------------------------|-----------------|-------------------|-------------------|------|-------|
| | Ganga Bhogpur | Khand Gaon | Naigoth | Taily Sunoli | Goom | Banali | Suri | Kandhla Badethi | Chhaupariyal Gaon | Bagauri | Juma | Gangi |
| Marginal | 1.6 | - | 2.04 | 3.22 | - | 6.25 | 1.06 | 1.19 | 2.5 | - | 1.98 | 2.08 |
| Small | 1.5 | - | 1.27 | 2.82 | 0 | 2.64 | 1.78 | 0.69 | 1.68 | - | 2.38 | 2.88 |
| Medium | 1 | - | 1.11 | 1.3 | 0.08 | 2.73 | 1.48 | 0.45 | 1.84 | - | 1.43 | 1.75 |
| Large | 0.15 | 0.14 | 0.42 | - | 0.48 | 1.9 | 0.8 | 0.57 | 0.96 | - | - | 0.95 |
| Overall | 1.26 | 0.14 | 1.48 | 2.58 | 0.25 | 2.78 | 1.52 | 0.51 | 1.52 | - | 1.85 | 1.63 |

Annex 15: DAP Potential for Mountain Agriculture

| Particulars | Shivaliks | | | Middle Himalayas: Traditional | | | Middle Himalayas: Transformed | | | Greater Himalayas | | |
|-----------------------------|---------------|------------|---------|-------------------------------|------|--------|-------------------------------|-----------------|-------------------|-------------------|-------|-------|
| | Ganga Bhogpur | Khand Gaon | Naigoth | Taily Sunoli | Goom | Banali | Suri | Kandhla Badethi | Chhaupariyal Gaon | Bagauri | Juma | Gangi |
| Cropland, ha | 127 | 288 | 270 | 52 | 87 | 216 | 21 | 78 | 105 | 25 | 13 | 92 |
| Bullocks, No. | 160 | 40 | 400 | 134 | 22 | 600 | 32 | 40 | 160 | 0 | 24 | 150 |
| Available DAP, kW* | 41.6 | 10.4 | 104 | 34.84 | 5.72 | 156 | 8.32 | 10.4 | 41.6 | 0 | 6.24 | 39 |
| DAP, kW per ha | 0.33 | 0.04 | 0.39 | 0.67 | 0.07 | 0.72 | 0.4 | 0.13 | 0.4 | 0 | 0.48 | 0.42 |
| Surplus (+), or Deficit (-) | 0.04 | -0.33 | +0.02 | +0.3 | -0.3 | +0.35 | -0.03 | -0.24 | +0.03 | -0.37 | +0.11 | +0.05 |

* DAP value of each bullock = 0.26 kW

** Based on 0.37 kW per ha requirement of total power. If available human power is added to it, the total available power will be more than required.