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 ANALYSIS OF LIVESTOCK FARMS IN NICARAGUA A DETAILED STUDY OF COSTS AND RETURNS

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**9. ABSTRACT**  
 This study considered 160 livestock farms. The first emphasis was to give an overall perspective of costs and returns for the average farm (see Table 2). Comparisons of costs and returns were then made by:

- Size.....5 groupings
- Region.....5 groupings
- Type.....3 groupings
- Technology.....2 groupings

A consideration was given to the physical labor requirements (Table 7). These data also were analyzed in the context of size, region, type and technology.

Statistical tests of significance (Analysis of Variance) were made and are set forth in the Appendix Table 1. With respect to size, region, type and technology the following parameters were tested to ascertain significant differences:

- (1) Gross Income
- (2) Income Ratio
- (3) Total Labor
- (4) Total Cost

Coefficients of Variation (COV), F values and levels of significance are presented and it is noted that about half of the variables were statistically significant at the 10% or less level of probability.

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ANALYSIS OF LIVESTOCK FARMS IN NICARAGUA:  
A DETAILED STUDY OF COSTS AND RETURNS

Presented to  
Vice-Minister Mayo Vega  
and  
United States Agency for International Development

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## INTRODUCTION

The following analysis supplements the previous report, "Input-Output Analysis for Crops and Livestock in Nicaragua". In the sample 160 livestock farms were represented; this was the remainder from the original sample of 170 farms. Initially eight farms were eliminated for lack of data and/or appropriateness and finally two more farms were eliminated for similar reasons. Data are presented on a per head basis (average inventory). As noted in Table 1, size classifications varied from farms with less than 10 head to those with more than 500 head of livestock. However, 87.5% of all farms were in size classifications 2, 3 and 4 and over 58% of the farms were in sizes 3 and 4. The average number of head per farm (inventory basis) was 197 head of which 144 head were dairy and 53 beef. The average number of cattle per farm ranged from only 7 in size group 1 to 1146 in size group 5. (See Appendix Table 2.)

All regions except PS were represented in the sample. Region IS had the largest number of farms with 66 or over 43% of the total sample; IC was next with 50 farms or 31.3% of the farms. The Pacific regions, PC and PN, while representing about 24% of the total farms had a higher number of cattle per farm as compared to the other regions. For example, PC and PN had 283 and 320 head respectively per farm while regions IC and IS had 152 and 183 head respectively. Region IN had only 5 farms (about 3% of the sample) and averaged only 14 head per farm.

Table 1  
LIVESTOCK--SAMPLE DESCRIPTION

| <u>Size</u>           | <u>Number of<br/>Farms</u> | <u>Percent of<br/>Sample</u> |
|-----------------------|----------------------------|------------------------------|
| 1 (<10 head)          | 9                          | 5.6                          |
| 2 (10-50 head)        | 47                         | 29.4                         |
| 3 (51-100 head)       | 29                         | 18.1                         |
| 4 (101-500 head)      | 64                         | 40.0                         |
| 5 (500+ head)         | 11                         | 6.9                          |
| <br><u>Region</u>     |                            |                              |
| IC                    | 50                         | 31.3                         |
| IN                    | 5                          | 3.1                          |
| IS                    | 66                         | 41.3                         |
| PC                    | 18                         | 11.3                         |
| PN                    | 21                         | 13.1                         |
| <br><u>Type</u>       |                            |                              |
| Dairy                 | 146                        | 91.3                         |
| Beef                  | 6                          | 3.8                          |
| Mixed                 | 8                          | 5.0                          |
| <br><u>Technology</u> |                            |                              |
| Intensive             | 66                         | 41.3                         |
| Extensive             | 94                         | 58.8                         |

When stratified by type\* (dairy, beef or mixed) dairy dominated with 146 farms for over 91% of the sample. Beef and mixed types accounted for only 6 and 8 farms respectively. However, in numbers of head per farm, dairy type averaged 148; beef, 415 and mixed, 932. The mixed farms were very large farms albeit few in number.

When the farms were classified according to technology\* the division was 66 farms or 44.3% were intensive while the remaining 94 farms (58.8%) were classified as extensive.

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\*See Appendix B for the definition of farm type and technology.

#### PRODUCTION COSTS: LIVESTOCK--AN OVERALL VIEW

To gain an overall view and perspective for all livestock farms without reference to region, size, type or technology, Table 2 is presented. For the average livestock farm, Total Costs amounted to about C\$355 per head. Of the C\$355, about C\$222 were Fixed Costs amounting to 62.4% of the total. Variable Costs accounted for the remainder or about 37.6% of Total Costs. Of the Fixed Costs, those relating to land were most important averaging about C\$110 per head or 31% of Total Costs. Labor as a Fixed Cost accounted for 20% of Total Costs while items of the various or miscellaneous nature were C\$30 per head (8.4% of Total Costs) and repairs were about C\$11 or 3% of all costs.

Of Variable Costs, labor was not particularly important amounting to about C\$10 per head or less than 3% of Total Costs. Animal and machine power were insignificant inputs with a combined total cost of less than C\$1 per head. Feed and veterinary expenses were about C\$30 per head (8.4%). Other items such as fertilizer and chemicals, aperos and like items, gas and oil, technical assistance all were minor expenses with none exceeding 2½% of Total Costs. Dairy cattle purchases and beef cattle purchases as expenses accounted for C\$18 and C\$35 respectively. Interest was about C\$12 per head (3.3% of all costs).

Gross Returns for the average farm was C\$469.7 per head. Of this, dairy accounted for 74% with beef accounting for the

Table 2

## LIVESTOCK--AVERAGE PRODUCTION COSTS PER HEAD\*

|                           |        |        |
|---------------------------|--------|--------|
| TOTAL COST C\$            | 355.26 |        |
| FIXED COSTS C\$           | 221.82 | (62.4) |
| Land Opp.                 | 109.04 | (31.0) |
| Land Rent                 | 1.06   |        |
| Labor:                    |        |        |
| Management                | 21.20  | (20.0) |
| Labor                     | 49.91  |        |
| Various                   | 29.99  | (8.4)  |
| Repairs                   | 10.62  | (3.0)  |
| VARIABLE COSTS C\$        | 133.44 | (37.6) |
| Labor:                    |        |        |
| Application               | .34    | (2.9)  |
| Other                     | 9.94   |        |
| Animal Power              | .13    | --     |
| Machine Power             | .15    | --     |
| Feed and Veterinary       | 29.77  | (8.4)  |
| Hay and Silage            | 3.79   | (1.1)  |
| Fertilizer and Chemicals  | 2.83   | (.8)   |
| Inpl. y Aperos            | 7.92   | (2.2)  |
| Gas and Oil               | 8.92   | (2.5)  |
| Technical Assistance      | 3.18   | (.9)   |
| Dairy Expenses            | 1.65   | (.5)   |
| Dairy Purchases           | 18.00  | (5.1)  |
| Beef Purchases            | 35.10  | (9.8)  |
| Interest                  | 11.72  | (3.3)  |
| GROSS RETURNS C\$         | 469.17 |        |
| Net Cash Income           | 223.12 |        |
| Net Farm Income           | 335.73 |        |
| Net Benefit C\$           | 113.91 |        |
| Return on Investment      | 32.1   |        |
| Return on Working Capital | 85.4   |        |
| Head/mz                   | .87    |        |
| Income Ratio (dairy/beef) | 74/26  |        |

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\*Data in parentheses refer to percentage of Total Cost.

remaining 26%. Net Cash Income was C\$223.12 and Net Farm Income was C\$335.73 per head. The Net Benefit was almost C\$114 per head. Rate earned on investment and on working capital averaged 32.1 and 85.4 respectively and the average number of head per mz. was .87. With this background as a basis for the average, we now turn to the various classifications.

## LIVESTOCK--PRODUCTION COSTS BY SIZE

Table 3 sets forth the basic information for all livestock farms according to size group.\* Total Costs per head showed little variance ranging from a high of C\$377 in size group 2 to a low of about C\$303 in size group 1. Fixed Costs, however, exhibited considerably more variance both in absolute terms and as a percentage of Total Cost. The high in Fixed Costs (both absolutely and relatively) was in size group 2 where Fixed Costs were C\$262 per head or 70% of Total Costs and the low (both absolutely and relatively) was in size group 3 where C\$192 per head (56% of all costs) were in this category. Land costs as a Fixed Cost were directly correlated with size. In the smallest size group, Size 1, only about a total of C\$78 was spent for land whereas this same item amounted to about C\$121 in the highest size group, Size 5. The percentage of Total Costs for land costs was fairly constant for sizes 1 through 4 but in the largest size these costs accounted for about 35% of all costs. Labor as a Fixed Cost ranged from a high of C\$146 per head in size 2 to a low of C\$66-68 in the three larger size groups. As a Fixed Cost, repairs were not great, never exceeding 3% of Total Costs. The other fixed

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\*The size groupings were:

|                         |                          |
|-------------------------|--------------------------|
| Size 1 .... <10 head    | Size 4 .... 101-500 head |
| Size 2 .... 10-50 head  | Size 5 .... 500+ head    |
| Size 3 .... 51-100 head |                          |

Table 3

## LIVESTOCK--PRODUCTION COSTS PER HEAD BY SIZE GROUP\*

|                           | <u>1 (&lt;10)</u> | <u>2 (10-50)</u> | <u>3 (51-100)</u> | <u>4 (101-500)</u> | <u>5 (500+)</u> |
|---------------------------|-------------------|------------------|-------------------|--------------------|-----------------|
| TOTAL COST C\$            | 302.69            | 377.26           | 342.11            | 360.53             | 349.01          |
| FIXED COSTS C\$           | 198.13 (65)       | 262.94 (70)      | 192.36 (56)       | 216.98 (60)        | 228.60 (65)     |
| Land Opp.                 | 71.74 (26)        | 92.38 (26)       | 94.85 (29)        | 103.22 (29)        | 120.55 (35)     |
| Land Rent                 | 6.15              | 4.56             | 2.09              | 1.23               | .28             |
| Labor:                    |                   |                  |                   |                    |                 |
| Management                | 117.55 (39)       | 86.17 (36)       | 23.57 (19)        | 18.44 (19)         | 16.95 (19)      |
| Labor                     | 0                 | 59.55 (36)       | 42.19 (19)        | 49.91 (9)          | 51.51 (8)       |
| Various                   | 1.58 --           | 19.70 (5)        | 24.24 (7)         | 32.77 (9)          | 28.68 (8)       |
| Repairs                   | 1.11 --           | 10.58 (3)        | 5.42 (1)          | 11.41 (3)          | 10.63 (3)       |
| VARIABLE COSTS C\$        | 104.56 (35)       | 114.32 (30)      | 149.75 (44)       | 143.55 (40)        | 120.41 (35)     |
| Labor:                    |                   |                  |                   |                    |                 |
| Applic.                   | 0                 | .10 (4)          | 0 (5)             | .68 (4)            | .02 (1)         |
| Other                     | 34.85 (12)        | 14.12 (4)        | 15.58 (5)         | 14.38 (4)          | 2.97 (1)        |
| Animal Power              | .47 --            | 0 --             | 0 --              | .27 --             | 0 --            |
| Machine Power             | 0 --              | 0 --             | 0 --              | .32 --             | 0 --            |
| Feed and Veterinary       | 15.61 (5)         | 15.74 (4)        | 34.92 (10)        | 40.67 (11)         | 17.08 (5)       |
| Hay and Silage            | 8.41 (3)          | 12.89 (3)        | 3.60 (1)          | 5.86 (2)           | .32 --          |
| Fertilizer and Chemicals  | 4.76 (2)          | 2.02 (1)         | 2.53 (1)          | 3.27 (1)           | 2.43 (1)        |
| Inpl. y Aperos            | 22.35 (7)         | 14.44 (4)        | 8.90 (3)          | 9.75 (3)           | 4.77 (1)        |
| Gas and Oil               | 0 --              | 1.80 --          | 9.71 (3)          | 12.81 (3)          | 4.80 (1)        |
| Technical Assistance      | 1.74 --           | 1.09 --          | .83 --            | 2.09 (1)           | 5.14 (2)        |
| Dairy Expenses            | 5.96 (2)          | 3.09 (1)         | 1.14 --           | 1.90 (1)           | 1.24 --         |
| Dairy Purchases           | 0 --              | 28.06 (7)        | 47.90 (14)        | 22.81 (6)          | 5.78 (2)        |
| Beef Purchases            | 0 --              | 7.40 (2)         | 12.84 (4)         | 16.72 (5)          | 66.35 (19)      |
| Interest                  | 10.41 (4)         | 13.57 (4)        | 11.80 (3)         | 12.02 (3)          | 9.51 (3)        |
| GROSS RETURNS C\$         | 360.06            | 420.50           | 408.49            | 451.78             | 506.34          |
| Net Cash Income           | 142.58            | 136.78           | 162.13            | 194.49             | 277.89          |
| Net Farm Income           | 255.50            | 306.18           | 258.74            | 308.23             | 285.93          |
| Net Benefit C\$           | 57.37             | 43.24            | 66.38             | 91.25              | 157.33          |
| Return on Investment      | 19.0              | 11.5             | 19.4              | 25.3               | 45.1            |
| Return on Working Capital | 54.9              | 37.8             | 44.3              | 63.6               | 130.7           |
| Head/mz                   | .70               | .84              | .73               | .80                | 1.02            |
| Income Ratio (dairy/beef) | 88/12             | 90/10            | 84/16             | 85/15              | 58/42           |

\*Data in parentheses refer to percentage of Total Cost.

item, miscellaneous or various costs, ranged from a high of about 9% of all costs in size group 4 to nominal in the first size group. Variable Costs ranged from a low of about C\$105 in the smallest size group (35% of all costs) to C\$150 in size group 3 (44% of all costs). Only in the smallest size group (Size 1) did labor as a Variable Cost amount to a significant input; in this case, 12% of all costs. Animal power and machine power as inputs were insignificant. Feed and veterinary expenses showed considerable variance ranging from 10-11% of all costs in sizes 3 and 4 to 4-5% in the remaining size groupings. Hay and silage expenditures were also variable ranging from almost C\$13 per head in size 2 (3% of all costs) to less than C\$1 in the largest size group. Fertilizer and chemicals were not a significant input and showed small variance. The item for aperos ranged from a high of C\$22 or 7% of all costs in size 1 to less than C\$5 or 1% of all costs in the largest size group. Gas and oil expenses were not important inputs in the first two size groups but did amount to 3% of all costs in sizes 3 and 4. Technological assistance was unimportant in the first four size groupings and only in the largest size group did it amount to 2% of all costs. Dairy expenses were not great ranging from about C\$1 in size group 3 to almost C\$6 in size 1. Dairy purchases showed high variance amounting to almost C\$48 (14% of all costs) in size 3 to no purchases in the smallest size group. Beef purchases like dairy purchases showed wide variance with a range from no purchases in Size 1 to over C\$66 per head in

the largest size group (19% of all costs).\* Interest was an input of some importance and showed much stability when viewed as a percentage of the Total Cost. The range was from a low of about 3% for size groups 3, 4 and 5 to 4% for sizes 1 and 2.

Gross Returns were almost directly correlated with size ranging from C\$360 in size 1 to C\$506 in size 5. Likewise, the other measures of farm returns were correlated with size and Net Benefit ranged from a low of C\$43 per head in size group 2 to a high of C\$157 in size 5. Returns on Investment and Working Capital were from a low of about 12 and 38 respectively in size 2 to a high of 45 and 131 respectively in size 5. The measure, head per mz, averaged .87 for all farms and varied from .70 in size 1 to 1.02 in size 5 and correlated well with the land charges noted prior. Most of the income for the first four size groups came from dairy. The range was narrow from a high of 90% in size 2 to a low of 84% in size 3. However, for the largest size group only 58% of the income was from dairy and the remainder, of course, from beef. All in all, the returns by size group are impressive either when viewed in monetary terms or in percentage returns. Certainly, economies of scale are noted as income generally increased with size denoting the larger efficiency with the large size groups.

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\*It should be noted that the largest size group had more beef cattle absolutely and relatively than other sizes. Almost 40% of the inventory were beef cattle in size 5 as compared with the average of all farms where only about 27% of the inventory were beef.

## LIVESTOCK--PRODUCTION COSTS BY REGION

As previously noted, 5 regions were included in the sample; only the PS region was not present. The farms in the Pacific regions were considerably larger than those in the Interior. (See Appendix Table 2.) In region IN, only 5 farms were represented and they were quite small with an average of only 14 head per farm. Table 4 sets forth the production and income data per head by the various regions. There are sharp differences between the Interior regions and the Pacific regions. In the former, the range in Total Cost was only from about C\$224 per head in IN to C\$288 in IC. However, in the Pacific region the range was from C\$463 in PN to C\$501 in PC. Fixed Costs ranged from a low of about C\$169 in IS to C\$292 in PC. In all regions, land was the most important fixed input both from an absolute and percentage standpoint.\*

The next major input was fixed labor and with the exception of IN averaged about 20% of Total Costs. Repairs showed some variance with IN reporting no costs for this item to IC where C\$14 (5% of Total Cost) were spent for this item. Various costs showed a similar pattern ranging from a low of about C\$3 in IN to over C\$50 in PN. Variable Costs varied from an absolute low of C\$45 (20% of all costs) in IN to a high of over C\$209 (42%) in PC. Labor as a Variable Cost was relatively unimportant in all of the regions with the exception of IN

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\*However, in IN, fixed labor charge was almost as much as that for land.

Table 4

## LIVESTOCK--PRODUCTION COSTS PER HEAD BY REGION\*

|                           | <u>IC</u>   | <u>IN</u>   | <u>IS</u>   | <u>PC</u>   | <u>PN</u>   |
|---------------------------|-------------|-------------|-------------|-------------|-------------|
| TOTAL COST C\$            | 288.21      | 223.89      | 276.82      | 501.09      | 462.99      |
| FIXED COSTS C\$           | 205.27 (71) | 178.66 (80) | 168.88 (61) | 291.73 (58) | 283.12 (61) |
| Land Opp.                 | 118.04 (41) | 88.05 (39)  | 75.24 (28)  | 147.51 (30) | 130.73 (28) |
| Land Rent                 | .66 (41)    | 0 (39)      | 1.60 (28)   | .56 (30)    | .92 (28)    |
| Labor:                    |             |             |             |             |             |
| Management                | 17.75 (19)  | 87.39 (39)  | 25.38 (22)  | 21.87 (19)  | 16.40 (19)  |
| Labor                     | 37.15 (19)  | 0 (39)      | 35.83 (22)  | 74.64 (19)  | 71.45 (19)  |
| Various                   | 12.87 (6)   | 3.22 (2)    | 24.02 (9)   | 35.63 (7)   | 50.18 (11)  |
| Repairs                   | 13.80 (5)   | 0 --        | 6.81 (2)    | 11.52 (2)   | 13.44 (3)   |
| VARIABLE COSTS C\$        | 82.94 (29)  | 45.23 (20)  | 107.94 (39) | 209.36 (42) | 179.87 (39) |
| Labor:                    |             |             |             |             |             |
| Application               | .41 (3)     | 0 (9)       | 0 (6)       | .74 (2)     | .48 (1)     |
| Other                     | 7.50 (3)    | 20.61 (9)   | 15.80 (6)   | 9.94 (2)    | 2.04 (1)    |
| Animal Power              | 0 --        | .42 --      | 0 --        | .82 --      | 0 --        |
| Machine Power             | .65 --      | 0 --        | 0 --        | 0 --        | 0 --        |
| Feed and Veterinary       | 22.83 (8)   | 5.61 (3)    | 14.75 (5)   | 95.23 (19)  | 15.32 (3)   |
| Hay and Silage            | .17 --      | 0 --        | .03 --      | 18.74 (4)   | 3.37 (1)    |
| Fertilizer and Chemicals  | 2.40 (1)    | .63 --      | .28 --      | 8.39 (2)    | 3.73 (1)    |
| Inpl. y Aperos            | 8.30 (3)    | 1.20 --     | 9.19 (3)    | 8.39 (2)    | 4.93 (1)    |
| Gas and Oil               | 11.62 (4)   | 5.07 (2)    | 6.29 (2)    | 14.48 (3)   | 6.41 (1)    |
| Technical Assistance      | 1.60 (1)    | 0 --        | 2.00 (1)    | 2.85 --     | 7.39 (2)    |
| Dairy Expenses            | 1.17 --     | 6.03 (3)    | 1.76 (1)    | 2.90 --     | .98 --      |
| Dairy Purchases           | 11.70 (4)   | 0 --        | 26.75 (10)  | 29.73 (6)   | 1.13 --     |
| Beef Purchases            | 6.36 (2)    | 0 --        | 21.62 (8)   | 1.07 --     | 118.97 (26) |
| Interest                  | 8.13 (3)    | 5.66 (3)    | 9.47 (3)    | 17.08 (3)   | 15.12 (3)   |
| GROSS RETURNS C\$         | 306.74      | 152.76      | 359.65      | 618.16      | 740.16      |
| Net Cash Income           | 136.69      | 34.94       | 158.27      | 264.59      | 407.91      |
| Net Farm Income           | 223.80      | 107.53      | 251.71      | 408.80      | 560.29      |
| Net Benefits C\$          | 18.53       | -71.13      | 82.83       | 117.97      | 277.17      |
| Return on Investment      | 6.4         | -31.8       | 29.9        | 23.4        | 59.9        |
| Return on Working Capital | 22.4        | -157.3      | 76.7        | 55.9        | 154.1       |
| Head/mz                   | .78         | 1.06        | .73         | 1.11        | 1.25        |
| Income Ratio (dairy/beef) | 71/29       | 98/2        | 79/21       | 95/5        | 57/43       |

\*Data in parentheses refer to percentage of Total Cost.

and IS where it was 9% and 6% of all costs respectively. Animal power and machine power were insignificant costs. Feed and veterinary expenses were highly variable ranging from a low of less than C\$6 in IN (3% of total costs) to over C\$95 per head in PC (19%). Only in region PC did hay and silage amount to a major input; in that region almost a total C\$19 per head was expended or 4% of Total Costs. Feed and chemicals were not a major input in any region with a range from less than C\$1 per head in regions IN and IS to slightly over C\$8 in PC. Costs for small tools and aperos amounted to about C\$1 in IN to over C\$9 in IS. Gas and oil expense while showing some variation was a major expenditure in at least two regions, IC and PC, where it accounted for 3 to 4% of Total Costs. Technical assistance was not important except in region PN where it was 2% of the Total Costs. Dairy expenditures likewise were not high. (However, this item did amount to C\$6 per head in region IN.) Dairy purchases showed high variance with none being recorded in IN to almost C\$29 per head in PC and C\$27 in IS. Beef purchases showed a similar variance with IN again not recording any purchases while PN had C\$119 per head for this expenditure.\* Interest as a cost was consistent averaging 3% of Total Costs for all regions.

Gross Returns showed a wide divergence from a low of C\$153 per inventory head in IN to a high of over C\$740 per head

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\*Note that over 54% of the inventory in region PN were beef animals (see Appendix Table 2) and that a high percentage of the income was derived from beef sales.

in PN. As noted prior, the farms in region IN were small whereas the farms in the Pacific regions were much larger than average. In addition to the productivity, another item influencing returns was the prices for dairy products as shown in Appendix Table 3. The Pacific regions averaged C\$4 per gallon whereas in the Interior regions prices were much lower with the IC averaging only C\$2.62 per gallon. Average gallons of milk sold per head (average inventory) was only 15 in IN as compared to over 194 in PC. Region IN, however, was the chief cheese producing region with over 41 pounds of cheese per head sold. (This compares to about 12 pounds in IC, 8 in IS, 1 in PC and none in PN.) Again, we note that IN's price for cheese was the lowest of any region averaging only C\$1.50 per pound, only half of the price received in IS (C\$3). Cash Farm Income and Net Farm Income were all positive for every region with the Pacific areas far exceeding those of the Interior. On a Net Benefit basis, however, the range was a -C\$71 per head in IN to over C\$277 per head in PN. Returns on the Investment and Working Capital varied from a negative figure in IN to a high of 60 and 154% respectively in PN. Another indication of the efficiency and the quality of production carried on in the various regions can be found by the head per mz. (IN, because of the fewness of farms is excluded from this example.) Note that in regions IC and IS only .78 and .73 head could be accommodated per mz while in the Pacific regions one manzana accommodated more than one head. While land costs were higher in the Pacific regions,

the productivity likewise was higher. The income derived from dairy was highest in region IN where 98% of the income was from dairy and PC where 95% was received from dairy sources. Lowest percentage of income received from dairy was in PN where only 57% was received from this source.

## LIVESTOCK--PRODUCTION COSTS BY TYPE OF FARM

In this section the 160 livestock farms are now considered by type (Table 5). Type is defined as dairy, beef and mixed. Farms were classified on the basis of Gross Returns to dairy versus beef. If dairy income was equal to or greater than 60% of all income then the classification was dairy. If beef income was equal to or greater than 60% of total income then the classification was beef. If neither beef or dairy income exceeds 60% then the classification is a mixed farm (see Appendix B). Of the 160 farms all but 14 were classified as dairy. Six were beef farms and 8 were mixed. A considerable variance in numbers of livestock are shown among the types. Dairy farms averaged 148 head; beef, 415; and mixed, 932 (see Appendix Table 2). On a Total Cost basis, dairy farms incurred C\$343 per head; beef, C\$299; and mixed, C\$408. Fixed Costs varied from a low of C\$168 for the beef farms to a high of about C\$240 for the mixed farms. In all cases the land costs constituted the major Fixed Cost. (Actually, the land costs for all farms were quite close varying from about C\$108 for the dairy farms to slightly less than C\$115 per head for the mixed farms.) The fixed labor for dairy and mixed farms was a significant item accounting for 22% of all costs in dairy and 18% in mixed. Repairs amounted to 3-4% for all farms. The classification "various" was important in the mixed farms where it was 10% of all costs and in the dairy farms where it was 8%. Variable Costs ranged from a low of about C\$122

Table 5

## LIVESTOCK--PRODUCTION COSTS PER HEAD BY TYPE\*

|                           | Dairy       | Beef        | Mixed       |
|---------------------------|-------------|-------------|-------------|
| TOTAL COST C\$            | 343.41      | 299.33      | 408.36      |
| FIXED COSTS C\$           | 221.88 (65) | 168.18 (56) | 239.64 (59) |
| Land Opp.                 | 107.11 (32) | 110.88 (37) | 114.14 (28) |
| Land Rent                 | 1.37        | 0           | .52         |
| Labor:                    |             |             |             |
| Management                | 25.00       | 14.61       | 12.37       |
| Labor                     | 49.81 (22)  | 18.08 (11)  | 60.84 (18)  |
| Various                   | 28.35 (8)   | 11.49 (4)   | 40.91 (10)  |
| Repairs                   | 10.24 (3)   | 13.12 (4)   | 10.86 (3)   |
| VARIABLE COSTS C\$        | 121.53 (35) | 131.15 (44) | 168.72 (41) |
| Labor:                    |             |             |             |
| Application               | .50 (4)     | 0 (2)       | 0 (1)       |
| Other                     | 13.09       | 4.80        | 2.50        |
| Animal Power              | .19 --      | 0 --        | 0 --        |
| Machine Power             | .23 --      | 0 --        | 0 --        |
| Feed and Veterinary       | 37.89 (11)  | 17.11 (6)   | 10.45 (3)   |
| Hay and Silage            | 5.24 (1)    | .20 --      | .79 --      |
| Fertilizer and Chemicals  | 2.99 (1)    | .60 --      | 3.13 (1)    |
| Inpl. y Aperos            | 9.12 (3)    | 8.16 (3)    | 4.37 (1)    |
| Gas and Oil               | 10.87 (3)   | 4.71 (2)    | 4.66 (1)    |
| Technical Assistance      | 2.05 (1)    | 3.41 (1)    | 6.40 (2)    |
| Dairy Expenses            | 2.07 (1)    | .37 --      | .79 --      |
| Dairy Purchases           | 24.18 (7)   | 16.01 (5)   | 0 --        |
| Beef Purchases            | 1.59 --     | 66.96 (22)  | 121.75 (29) |
| Interest                  | 11.52 (3)   | 8.82 (3)    | 13.88 (3)   |
| GROSS RETURNS C\$         | 423.83      | 347.75      | 641.17      |
| Net Cash Income           | 187.74      | 159.45      | 346.96      |
| Net Farm Income           | 302.30      | 216.60      | 472.45      |
| Net Benefit C\$           | 80.42       | 48.42       | 232.81      |
| Return on Investment      | 23.4        | 16.2        | 57.0        |
| Return on Working Capital | 66.2        | 37.0        | 138.0       |
| Head/mz                   | .80         | .94         | 1.11        |
| Income Ratio (dairy/beef) | 91/9        | 16/84       | 51/49       |

\*Data in parentheses refer to percentage of Total Cost.

per head for dairy farms (35%) to a high of about C\$169 per head in the mixed farms (41%). Only for the dairy farms was variable labor of any great consequence. In these farms about a total of C\$14 per head was spent for variable labor (4% of Total Costs). Animal power and machine power were not significant by any type. The classification, feed and veterinary expense, was quite important for the dairy farms--C\$38 per head (11% of all costs). Hay and silage accounted for about C\$5 per head in dairy farms but was insignificant for the other types. Fertilizer and chemicals were relatively unimportant items amounting to only about 1% of all costs in the dairy and mixed farms. The item, aperos, accounted for about 3% of all costs in the dairy and beef farms and only 1% in the mixed. Gas and oil expense was of some importance in the dairy farms where it was C\$11 (1% of all costs). Technical assistance amounted to 1-2% of all costs for the various farm types with the mixed farms spending 2-3 times more for this item than the others. As would be expected, dairy expenditures were of little importance in the beef and mixed farms but did account for 1% of Total Costs in the dairy farms. Dairy purchases were important in the dairy farms and in the beef farms where 7% and 5% respectively of all costs were spent on this item. Beef purchases were of high importance in the beef and the mixed farms averaging about C\$67 for the beef farms and C\$122 for the mixed farms. Interest was a uniform 3% of all costs for all types of farms.

Gross Returns varied from a low of C\$348 for beef farms to a high of over C\$641 per head for the mixed farms. All income measures were positive for all three types and Net Benefits ranged from a low of about C\$48 per head in the beef farms to almost C\$233 per head for the mixed farms. Returns on Investment and Working Capital were favorable varying from a low in the beef farms to a high in the mixed farms. Head per m<sup>2</sup> ranged from a low of .8 in the dairy farms to a high of 1.11 in the mixed farms. The percent of income from dairy was 91% in the dairy farms, 16% in the beef, and 51% in the mixed farms. All in all, every type showed favorable gains. Nonetheless, it should be emphasized that the vast majority of these farms (over 91%) were dairy farms and any conclusion should be conditioned accordingly.\*

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\*An interesting comparison can be made of the incomes of the farms. It should be noted that while the dairy farms had a higher dairy income (about C\$385 per head) and this accounted for 91% of the returns, the mixed farms too had considerable dairy income (approximately C\$327 per head) but also had a very high return for beef (about C\$314 per head) and hence were classified as mixed in spite of a Gross Return which exceeded the dairy farm by over 50% and the beef farm by 84%.

## LIVESTOCK--PRODUCTION COSTS BY TECHNOLOGY

In this section the costs per head are examined as classified by technology. Technology will be indicated either as intensive or extensive and the criteria for the technological classification are set forth in Appendix B. Essentially, the measure of technological division was whether a farm had a greater than the average number of head per mz. If so, they were classified as intensive. For those farms which had less than the average head per mz were classified as extensive. Hence, as pointed out in Table 2 the average head per mz was .87 and therefore those farms with greater than .87 were classified as intensive and those with less were extensive. As indicated in Table 1, 66 farms or about 41.3% of the total were classified as intensive and 94 or 58.8% were classified as extensive. The intensive farms, it should be noted, were considerably larger in size. The intensive farms had an average inventory of 284 head vs. 137 head for the extensive farms (see Appendix Table 2). Table 6 sets forth the production costs per head by the levels of technology. As would be expected the intensive farms had a higher Total Cost. Total Cost for the intensive farms was approximately C\$386 while those of the extensive farms were about C\$310. Fixed Costs were higher in an absolute sense on the intensive farms; however, in a relative sense, the extensive farms had almost two-thirds of their cost classified as fixed. In both cases the land costs comprised the major Fixed Costs and was 31%

Table 6

## LIVESTOCK--PRODUCTION COSTS PER HEAD BY TECHNOLOGY\*

|                           | <u>INT</u>  | <u>EXT</u>  |
|---------------------------|-------------|-------------|
| TOTAL COST C\$            | 386.33      | 309.70      |
| FIXED COSTS C\$           | 234.13 (61) | 203.60 (66) |
| Land Opp.                 | 118.57      | 95.22       |
| Land Rent                 | .80 (31)    | 1.44 (31)   |
| Labor:                    |             |             |
| Management                | 20.84       | 21.73       |
| Labor                     | 51.04 (19)  | 48.27 (16)  |
| Various                   | 32.39 (8)   | 26.14 (8)   |
| Repairs                   | 10.49 (3)   | 10.80 (4)   |
| VARIABLE COSTS C\$        | 152.20 (39) | 106.10 (34) |
| Labor:                    |             |             |
| Application               | .31         | .39         |
| Other                     | 7.85 (2)    | 12.87 (4)   |
| Animal Power              | .22 --      | 0 --        |
| Machine Power             | 0 --        | .38 --      |
| Feed and Veterinary       | 31.56 (8)   | 27.16 (9)   |
| Hay and Silage            | 5.73 (1)    | .97 --      |
| Fertilizer and Chemicals  | 2.78 (1)    | 2.91 (1)    |
| Inpl. y Aperos            | 6.32 (2)    | 10.26 (3)   |
| Gas and Oil               | 7.34 (2)    | 11.20 (4)   |
| Technical Assistance      | 4.44 (1)    | 1.35 --     |
| Dairy Expenses            | 1.60 --     | 1.70 --     |
| Dairy Purchases           | 15.29 (4)   | 21.66 (7)   |
| Beef Purchases            | 57.17 (15)  | 4.87 (2)    |
| Interest                  | 11.59 (3)   | 10.38 (3)   |
| GROSS RETURNS C\$         | 559.75      | 337.12      |
| Net Cash Income           | 291.82      | 122.97      |
| Net Farm Income           | 407.55      | 231.02      |
| Net Benefit C\$           | 173.42      | 27.42       |
| Return on Investment      | 44.8        | 113.8       |
| Return on Working Capital | 8.9         | 25.8        |
| Head/mz                   | 1.36        | .57         |
| Income Ratio (dairy/beef) | 70/30       | 83/17       |

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\*Data in parentheses refer to percentage of Total Cost.

of all costs in each case. However, the absolute cost of land was about C\$119 per head for the intensive farms vs. C\$97 per head for the extensive farms. Thus, the more productive land in the intensive farms was reflected. The intensive farms expended about 19% of Total Costs for fixed labor while the extensive farms spent only 16% for the same item. Repairs were approximately the same--about C\$10-11 for each classification and various costs were about 8% for each classification.

Variable Costs were C\$152 for intensive farms and C\$106 for the extensive farms. In both cases variable labor constituted a minor cost--2% in intensive and 4% for the extensive farms. The input cost for animal and machine power was not a significant entity for either classification. Feed and veterinary expenses were sizeable in both cases amounting to about C\$32 in the intensive (8%) and C\$27 in the extensive (9%). Hay and silage comprised a minor item in both classifications amounting to less than C\$6 in the intensive farms and less than C\$1 in the extensive farms. Fertilizer and chemical expenditures amounted to slightly less than C\$3 in each case. The item for small tools and implements varied from C\$6 (2%) in the intensive classification to a little over C\$10 (3%) in the other technology class. Gas and oil as a variable cost amounted to C\$7 (2%) in the intensive farms and somewhat more, C\$11 (4%), for the extensive farms. Technical assistance and dairy expenses were minor expenses in both cases. Dairy purchases amounted to a significant expenditure in both cases with about C\$15 (4%) in the intensive farms and almost C\$22 (7%)

in the extensive farms. Beef purchases did not amount to much in the extensive farms--less than C\$5 (2%) but in the other classification, over C\$57 per head were expended for this item (15%). Interest amounted to about 3% of all costs in both cases.

Gross Returns were significantly higher in the intensive farms as compared to the extensive--C\$560 vs. C\$337 per head. In both cases positive Net Cash Incomes, Net Farm Incomes and Net Benefits accrued. However, all income items were considerably greater for the intensive farms--the Net Benefit figure, for example, was much higher in the intensive farms--C\$173 vs. C\$27 per head. Returns on Investment and Working Capital were very high in the intensive farms--45 and 114 respectively and much more modest in the extensive farms--9 and 26 respectively. The ratio of dairy to beef income was 70/30 in the intensive farms vs. 83/17 in the extensive farms. The number of head per mz was 1.36 in the intensive as compared to only .57 in the extensive farms.

LABOR REQUIREMENTS BY SIZE, REGION,  
TYPE AND TECHNOLOGY

(Table 7)

Size

Labor requirements per head varied from a high of 22.2 days in the smallest size to only 8.0 days in the largest size. On an average, about 85% of the labor was in the fixed category. This varied from about 78% of the labor being fixed in sizes 3 and 4 to 96% in size 5. Certainly economies of size are evident with a reduction of labor per head from size 1 to size 5--e.g. the labor requirements for the largest size were only about 36% (on a per head basis) of that of the smallest size.

Region

Marked regional differences were manifest when labor requirements were compared. The labor days ranged from a low of 7.5 days per head in IC to a high of 13.4 in IN. If region IN is excluded (due to the fewness of farms), it is found that region PC, a very efficient region, also had high labor with about 13.3 days per head. Region PN had the lowest amount of variable labor--.4 days per head.

Type

The dairy farms used significantly more labor per head than beef farms--9.8 vs. 5.3 days. The mixed farms (which also had a large number of dairy cattle) used 8.7 days per

Table 7

LIVESTOCK--LABOR REQUIREMENTS PER HEAD  
BY SIZE, REGION, TYPE AND TECHNOLOGY

| Size                 | Days of Labor/Head |       |          |
|----------------------|--------------------|-------|----------|
|                      | Total              | Fixed | Variable |
| 1 (<10 head)         | 22.2               | 17.9  | 4.3      |
| 2 (10-50 head)       | 14.8               | 12.8  | 2.0      |
| 3 (51-100 head)      | 10.2               | 8.0   | 2.2      |
| 4 (101-500 head)     | 9.4                | 7.3   | 2.1      |
| 5 (500+ head)        | 8.0                | 7.7   | .4       |
| <u>Region</u>        |                    |       |          |
| IC                   | 7.5                | 6.4   | 1.1      |
| IN                   | 13.4               | 10.8  | 2.6      |
| IS                   | 8.1                | 5.9   | 2.2      |
| PC                   | 13.3               | 12.1  | 1.2      |
| PN                   | 9.8                | 9.3   | .4       |
| <u>Type</u>          |                    |       |          |
| Dairy                | 9.8                | 7.9   | 1.9      |
| Beef                 | 5.3                | 4.7   | .6       |
| Mixed                | 8.7                | 8.4   | .3       |
| <u>Technology</u>    |                    |       |          |
| Intensive            | 8.9                | 7.8   | 1.1      |
| Extensive            | 9.6                | 7.6   | 1.9      |
| Average of all farms | 9.2                | 7.8   | 1.4      |

head. It is significant that variable labor was much less important in the beef and mixed farms as compared to the dairy farms. In the dairy farms the variable labor amounted to 1.9 days per head; beef, .6 days; and mixed, .3 days. Hence, if only fixed labor is compared, the mixed farms actually used somewhat more labor per head--8.4 days vs. 7.9 days.

### Technology

The extensive farms used .7 more days per animal as compared to the intensive farms. However, most of this difference could be accounted for by the differences in variable labor. The extensive farms used an additional .8 days of variable labor, but extensive farms used slightly less fixed labor per head as compared to the intensive farms.

## SUMMARY

This study considered 160 livestock farms. The first emphasis was to give an overall perspective of costs and returns for the average farm (see Table 2). Comparisons of costs and returns were then made by:

|                      |             |
|----------------------|-------------|
| Size . . . . .       | 5 groupings |
| Region . . . . .     | 5 groupings |
| Type . . . . .       | 3 groupings |
| Technology . . . . . | 2 groupings |

A consideration was given to the physical labor requirements (Table 7). These data also were analyzed in the context of size, region, type and technology.

Statistical tests of significance (Analysis of Variance) were made and are set forth in the Appendix Table 1. With respect to size, region, type and technology the following parameters were tested to ascertain significant differences:

- (1) Gross Income
- (2) Income Ratio
- (3) Total Labor
- (4) Total Cost

Coefficients of Variation (COV), F values and levels of significance are presented and it is noted that about half of the variables were statistically significant at the 10% or less level of probability.

\* \* \* \*

The Tables 1 through 7 and accompanying discussion thereof form a basic summary. However, in Table 8, a briefing of the findings is presented. On the average, livestock farming was a profitable enterprise with Returns on Investment and working

Table 8

LIVESTOCK--HIGHEST AND LOWEST COSTS AND  
RETURNS BY SIZE, REGION, TYPE  
AND TECHNOLOGY

|                                      | Size | Region  | Type  | Technology |
|--------------------------------------|------|---------|-------|------------|
| Highest Total Cost                   | 4    | PC      | Mixed | Intensive  |
| Highest Fixed Cost                   | 2    | PC      | Mixed | Intensive  |
| Highest Variable Cost                | 3    | PC      | Mixed | Intensive  |
| Highest Gross Returns                | 5    | PN      | Mixed | Intensive  |
| Highest Net Benefit                  | 5    | PN      | Mixed | Intensive  |
| Highest Return on<br>Investment      | 5    | PN      | Mixed | Intensive  |
| Highest Income Ratio<br>(dairy/beef) | 2    | IN      | Dairy | Extensive  |
| Highest Milk Prices                  | NA   | PC & PN | NA    | NA         |
| Highest Average Herd Size            | 5    | PN      | Mixed | Intensive  |
| Highest Head/Mz                      | 5    | PN      | Mixed | Intensive  |
| Lowest Total Cost                    | 1    | IN      | Beef  | Extensive  |
| Lowest Fixed Cost                    | 3    | IS      | Beef  | Extensive  |
| Lowest Variable Cost                 | 2    | IN      | Dairy | Extensive  |
| Lowest Gross Returns                 | 1    | IN      | Beef  | Extensive  |
| Lowest Net Benefit                   | 2    | IN      | Beef  | Extensive  |
| Lowest Return on<br>Investment       | 2    | IN      | Beef  | Extensive  |
| Lowest Income Ratio<br>(dairy/beef)  | 5    | PN      | Beef  | Intensive  |
| Lowest Milk Prices                   | NA   | IC      | NA    | NA         |
| Lowest Average Herd Size             | 1    | IN      | Dairy | Extensive  |
| Lowest Head/Mz                       | 1    | IS      | Dairy | Extensive  |

Capital exceeding 32 and 85% respectively. An average Net Benefit of almost C\$114 per inventory head was made and the Cash Farm Income was almost twice that of the Net Benefit. Returns were highly correlated with size and while Total Costs was also increased with size, the increase was proportionately less than that of returns. Hence, larger farms showed highest net returns. The average income ratio (dairy/beef) was about 74/26 but varied from a high of 90/10 in size 2 to a low of 58/42 in the highest size grouping. The greatest intensity per mz was found in the highest size group where the head/mz ratio was 1.02 and the lowest was found in the first group where it was .70. (The average was about .87.)

Marked regional differences occurred with the Interior regions and the Pacific regions showing distinct differences. Highest returns were witnessed in the Pacific regions with PN leading all regions by considerable margin. Only in region IN was there negative returns and in this region only 5 farms out of the 160 were represented. Lowest costs but again the lowest returns were found in the Interior regions.

On a type classification the dairy farms constituted over 90% of the farms with only 6 farms being classified as beef and 8 as mixed. The mixed farms constituted a distinct entity and in general were very large and efficient farms.\* All classifications turned in positive income measures with dairy

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\*Although the mixed farms averaged 932 head, this sample was comprised of a very heterogeneous group of 8 farms which ranged from 24 to 4709 head per farm.

exceeding beef by some margin.

On the basis of technology the highest costs and highest returns were associated with the intensive type farms. However, while considerable differences did occur between the intensive-extensive farms, it should be noted that even here good Returns were made on Investment and Working Capital in the extensive farms (about 9% on investment and 26% on working capital). While these figures were considerably below the intensive farms it must be emphasized that such returns, in general were quite acceptable. Another point of emphasis is the differential in prices by region. The prices in the Pacific region for dairy products far exceeded that of other regions and those regions gave some comparative advantage; nonetheless these farms would have still been the most profitable with only average prices.

Days of labor per head decreased rapidly and consistently with increases in herd size. On a regional basis, region IC had the lowest requirement and IN and PC being the highest labor requirements. By type, dairy had the highest labor requirements and beef the lowest. When compared by technology the extensive farms used about 8% more labor than did the intensive farms.

Appendix Table 1

ANALYSIS OF VARIANCE FOR GROSS RETURNS, INCOME RATIO,  
 TOTAL LABOR, AND TOTAL COST--COEFFICIENTS OF  
 VARIATION, F VALUES AND LEVELS OF  
 SIGNIFICANCE

|                |            | <u>Coefficient<br/>of<br/>Variation</u> | <u>F Value</u> | <u>Prob. &gt; F</u> |
|----------------|------------|---|----------------|---------------------|
| Gross Returns: | Size       | 64.0                                    | .57            | .6886               |
|                | Region     | 59.4                                    | 6.93           | .0001               |
|                | Type       | 64.0                                    | .03            | .9710               |
|                | Technology | 63.6                                    | 1.14           | .2865               |
| Income Ratio:  | Size       | 20.6                                    | 5.10           | .0010               |
|                | Region     | 21.3                                    | 2.32           | .0588               |
|                | Type       | 10.7                                    | 247.18         | .0001               |
|                | Technology | 21.7                                    | .06            | .7930               |
| Total Labor:   | Size       | 55.3                                    | 10.9           | .0001               |
|                | Region     | 61.3                                    | 1.73           | .1449               |
|                | Type       | 61.0                                    | 3.04           | .0487               |
|                | Technology | 61.5                                    | 2.42           | .1175               |
| Total Cost:    | Size       | 72.0                                    | .69            | .6004               |
|                | Region     | 68.4                                    | 4.99           | .0011               |
|                | Type       | 72.2                                    | .07            | .9282               |
|                | Technology | 71.9                                    | .50            | .5134               |

Appendix Table 2

AVERAGE NUMBER OF CATTLE PER FARM BY  
SIZE, REGION, TYPE AND TECHNOLOGY

| Size                 | Total | Dairy | Beef |
|----------------------|-------|-------|------|
| 1 (<10 head)         | 7     | 6     | 1    |
| 2 (10-50 head)       | 28    | 23    | 5    |
| 3 (51-100 head)      | 74    | 59    | 15   |
| 4 (101-500 head)     | 241   | 194   | 47   |
| 5 (500+ head)        | 1146  | 709   | 437  |
| <u>Region</u>        |       |       |      |
| IC                   | 152   | 116   | 36   |
| IN                   | 14    | 12    | 2    |
| IS                   | 183   | 143   | 40   |
| PC                   | 283   | 257   | 26   |
| PN                   | 320   | 148   | 172  |
| <u>Type</u>          |       |       |      |
| Dairy                | 148   | 123   | 25   |
| Beef                 | 415   | 258   | 157  |
| Mixed                | 932   | 448   | 484  |
| <u>Technology</u>    |       |       |      |
| Intensive            | 284   | 195   | 89   |
| Extensive            | 137   | 108   | 28   |
| Average of all farms | 197   | 144   | 53   |

## Appendix Table 3

## PRECIOS PROMEDIOS

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## (AVERAGE PRICES)

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|                          | (MILK)<br>LECHE | (CHEESE)<br>QUESO | (CREAM)<br>CREMA | (BUTTER)<br>MANTEQUILLA |
|--------------------------|-----------------|-------------------|------------------|-------------------------|
|                          | <u>Glns.</u>    | <u>En Lbs.</u>    | <u>En Lbs.</u>   | <u>En Lbs.</u>          |
| Pacifico Central y Norte | 4.00            |                   |                  |                         |
| Interior Central         | 2.62            | 1.75              | 2.50             | 2.20                    |
| Interior Norte           | 2.64            | 1.50              |                  |                         |
| Interior Sur             | 2.65            | 3.00              | 2.50             | 2.50                    |
| Pacifico Sur             | -               | -                 | -                | -                       |

**APPENDIX A**

**APPENDIX B**

CRITERIA FOR ESTABLISHING  
INVENTORY AND BUDGET DATA

Determination of Inventory--Beef and Dairy

Average Inventory =  $\left[ \left\{ (133-1-01) + (134-1-01) \dots + (141-1-01) + (133-6-01) + (134-6-01) \dots + (141-6-01) \right\} \right] \div 2$

Average Dairy Inventory =  $(133-1-01) + (134-1-01) + (135-1-01) + (136-1-01) + (141-L-01) + (133-6-01) + (134-6-01) + (135-6-01) + (136-6-01) + (141-L-6-01) \div 2$

Average Beef Inventory = average inventory - average dairy inventory

Total Animal Months = (average inventory) (12 months)

Animal Months on Rented Land =  $(050-02)(050-03) + (051-02)(051-03)$

Animal Months on Owned Land = (total animal months) - (animal months on rented land)

Rent Paid = (animal months on rented land) (052)

Opportunity Cost of Farmers Own Land = (animal months on owned land) (052)

Dairy Cost Ratio = (average dairy inventory)  $\div$  (average inventory)

Beef Cost Ratio =  $(100) - (\text{dairy cost ratio})$

For Columns 059 through 066

Total Man Days = (01) (02)

Man Days Hired = (01) (03)

Total Man Days Non Paid = (total man days) - (man days hired)

Wage Rate = 04 or 05. If 04 is blank then multiply by the figure in 05.

Pecuarial--Costs

a = opportunity costs of farmers land (see p. 1) (non-cash)

b = rent cost (see p. 1) (cash)

c = fixed labor costs of management (cash) = (53-01)+(54-01)+  
(55-01)

d = fixed labor costs of labor (cash) = (56-01)+(57-01)+(58-01)

e = variable labor costs of application (cash)

59 (man days hired) (wage rate)  
60 (man days hired) (wage rate)  
61 (man days hired) (wage rate)

f = variable labor costs of application--non cash

59 (total man days non paid) (Cr\$ 8)  
60 (total man days non paid) (Cr\$ 8)  
61 (total man days non paid) (Cr\$ 8)

g = variable labor costs of other labor--cash

62 (man days hired) (wage rate)  
63 (man days hired) (wage rate)  
64 (man days hired) (wage rate)  
65 (man days hired) (wage rate)  
66 (man days hired) (wage rate)

h = variable labor costs of other labor--non cash

62 (total man days non paid) (Cr\$ 8)  
63 (total man days non paid) (Cr\$ 8)  
64 (total man days non paid) (Cr\$ 6)  
65 (total man days non paid) (Cr\$ 8)  
66 (total man days non paid) (Cr\$ 8)

i = variable animal units hired (cash)

|       |       |       |
|-------|-------|-------|
| 59-07 | 62-07 | 65-07 |
| 60-07 | 63-07 | 66-07 |
| 61-07 | 64-07 |       |

j = variable animal units owned (non cash)

|       |       |       |
|-------|-------|-------|
| 59-08 | 62-08 | 65-08 |
| 60-08 | 63-08 | 66-08 |
| 61-08 | 64-08 |       |

k = variable machine units hired (cash)

|       |       |       |
|-------|-------|-------|
| 59-09 | 62-09 | 65-09 |
| 60-09 | 63-09 | 66-09 |
| 61-09 | 64-09 |       |

l = variable machine units owned (non-cash)

|       |       |       |
|-------|-------|-------|
| 59-10 | 62-10 | 65-10 |
| 60-10 | 63-10 | 66-10 |
| 61-10 | 64-10 |       |

m = feed and veterinary expenses (cash)  
 (069-03)+(070-03)+(071-03)+(074-03)+(075-03)+(076-03)+  
 (077-03)+(078-03)

n = hay and silage expenses (cash)  
 (072-03)+(073-03)

o = fertilizer and bug expenses (cash)  
 080-03                      083-03  
 081-03                      084-03  
 082-03

p = implement costs (cash)  
 086-03                      089-03  
 087-03                      090-03  
 088-03

q = gas and oil (cash)  
 092-03                      095-03  
 093-03                      096-03  
 094-03                      097-03

r = dairy expenses (cash)  
 099-03                      103-03  
 100-03                      104-03  
 101-03                      105-03  
 102-03                      106-03

s = fixed various expenses (cash)  
 108-02                      116-02  
 109-02                      117-02  
 114-02                      118-02  
 115-02

t = technical assistance (cash)  
 119-02

u = repairs on the farm (cash)  
 110-02                      112-02  
 111-02                      113-02

v = dairy costs - animals bought (cash)

| Number      |   | Value/Unit |
|-------------|---|------------|
| 133-5-01    | x | 133-5-02   |
| 134-5-01    | x | 134-5-02   |
| 135-5-01    | x | 135-5-02   |
| 136-5-01    | x | 136-5-02   |
| 137-5-01    | x | 137-5-02   |
| 141-L-5-01x |   | 141-L-5-02 |

c of values

w = dairy losses -- animals died -- (non cash)

| <u>Number</u> |   | <u>Value/Unit</u> |
|---------------|---|-------------------|
| 133-3-01      | x | 133-3-02          |
| 134-3-01      | x | 134-3-02          |
| 135-3-01      | x | 135-3-02          |
| 136-3-01      | x | 136-3-02          |
| 137-3-01      | x | 137-3-02          |
| 141-L-3-01    | x | 141-L-3-02        |

c of values

x = beef costs--animals bought (cash)

| <u>Number</u> |   | <u>Value/Unit</u> |
|---------------|---|-------------------|
| 138-5-01      | x | 138-5-02          |
| 139-5-01      | x | 139-5-02          |
| 140-5-01      | x | 140-5-02          |
| 141-C-5-01    | x | 141-C-5-02        |

c of values

y = beef losses--animals died

| <u>Number</u> |   | <u>Value/Unit</u> |
|---------------|---|-------------------|
| 138-3-01      | x | 138-3-02          |
| 139-3-01      | x | 139-3-02          |
| 140-3-01      | x | 140-3-02          |
| 141-C-3-01    | x | 141-C-3-02        |

c of values

z = interest cost = (b+c+d+e+g+i+k+m+n+o+p+q+r+s+t+u+v+x)  
(.05)

Inventory Value Change

Value Cr\$

(133-1-01) x (133-1-02)  
 (134-1-01) x (134-1-02)  
 (135-1-01) x (135-1-02)  
 (136-1-01) x (136-1-02)  
 (137-1-01) x (137-1-02)  
 (138-1-01) x (138-1-02)  
 (139-1-01) x (139-1-02)  
 (140-1-01) x (140-1-02)  
 (141-C-1-01) x (141-C-1-02)  
 (141-L-1-01) x (141-L-1-02)

Beginning Inventory Value Cr\$

Value/Cr\$

(133-6-01) x (133-6-02)  
 (134-6-01) x (134-6-02)  
 (135-6-01) x (135-6-02)  
 (136-6-01) x (136-6-02)  
 (137-6-01) x (137-6-02)  
 (138-6-01) x (138-6-02)  
 (139-6-01) x (139-6-02)  
 (140-6-01) x (140-6-02)  
 (141-C-6-01) x (141-C-6-02)  
 (141-L-6-01) x (141-L-6-02)

Ending Inventory Value Cr\$

A = (E.I.V.)-(B.I.V.) = Net Change in Inventory Value

B = (A) (Dairy Inventory Ratio) = Value of Dairy Inventory Change

C = A - B = Value of Beef Inventory Change

Income Attachment

D = Dairy Animal (cash)

Dairy Animals Sold (Cash)

| Number     |   | Value/Unit      |
|------------|---|-----------------|
| 133-4-01   | x | <u>133-4-02</u> |
| 134-4-01   | x | 134-4-02        |
| 135-4-01   | x | 135-4-02        |
| 136-4-01   | x | 136-4-02        |
| 137-4-01   | x | 137-4-02        |
| 141-L-4-01 | x | 141-L-4-02      |

Sum of values

E = Dairy Animal Non-Cash

Dairy Animals Slaughtered

| Number   |   | Value/Unit |
|----------|---|------------|
| 133-3-03 | x | 133-3-04   |
| 134-3-03 | x | 134-3-04   |
| 135-3-03 | x | 135-3-04   |
| 136-3-03 | x | 136-3-04   |
| 137-3-03 | x | 137-3-04   |
| 141-3-03 | x | 141-3-04   |

ε of values

F = Value of Dairy Production

158-A1 x standard prices  
158-B1 x standard prices  
158-C1 x standard prices  
158-D1 x standard prices

ε of values

H = Beef Income

Beef Animals Sold

Beef Cash

| Number     |   | Value/Unit |
|------------|---|------------|
| 138-4-01   | x | 138-4-02   |
| 139-4-01   | x | 139-4-02   |
| 140-4-01   | x | 140-4-02   |
| 141-C-4-01 | x | 141-C-4-02 |

I = Beef Non-Cash

Beef Animals Consumed

| Number     |   | Value/Unit |
|------------|---|------------|
| 138-3-03   | x | 138-3-04   |
| 139-3-03   | x | 139-3-04   |
| 140-3-03   | x | 140-3-04   |
| 141-C-3-03 | x | 141-C-3-04 |

Cash Dairy Income = D

Non-Cash Dairy Income = B+E

Total Dairy Income = B+D+E+F

Cash Beef Income = H

Non-Cash Beef Income = C+I

Total Beef Income = C+H+I

## Budget Determination

Fixed Costs = a+b+c+d+j+l+s+u

Variable Costs = e+f+g+h+i+k+m+n+o+p+q+r+t+v+x+z

Cash Costs = b+c+d+e+g+i+k+m+n+o+p+q+r+s+t+u+v+x+z

### Farm Classification by Income

- If Dairy Income Ratio  $\geq$  60% then this is a Dairy Farm.
- If Beef Income Ratio  $\geq$  60% then this is a Beef Farm.
- If neither exceeds 60% then this is a Mixed Farm.

### Technological Breakdown

#### Land in Pasture

$$\text{Pasture} = (048-a) + (048-b) + (050-01) + (051-01)$$

#### Farm size by land in pasture

| <u>Pasture</u> | <u>Head/Mz</u> | Head = (Average Inventory) |
|----------------|----------------|----------------------------|
| <10            |                |                            |
| 10-50          |                |                            |
| 51-100         |                |                            |
| 101-500        |                |                            |
| 501+           |                |                            |

- 1) Find the average number of Mz per head for each category.
- 2) For those farms that have a greater than average number of head/Mz they will be classified intensive.
- 3) For those farms that have less than average number of head/Mz they will be classified extensive.

### By Operation (Type Farm by Income Source)

- 1) Cash cost/head
- 2) Variable cost/head
- 3) Fixed cost/head
- 4) Gross income (dairy and beef)
- 5) Net cash income (gross income - cash cost)
- 6) Net farm income (gross income - variable cost)
- 7) Net benefit (gross income - total cost)
- 8) Date of return to investment  
Net benefit/total cost (expressed as percent)
- 9) Rate of return to working capital  
Net benefit/variable cost (expressed as percent)