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SUMMARIES

COMPARATIVE ECONOMICS OF REARING OF CROSS-BRED AND PURE-BRED HEIFERS ON FARMS OF SMALL FARMERS

Y. P. Mahalle and V. D. Galgalikar*

In this paper an attempt has been made to study the comparative economics of rearing of cross-bred and pure-bred heifers by small farmers in the Integrated Cattle Development Project area of Akola district of Maharashtra State. It was observed that cross-bred heifers on an average required 838 days for first calving as against 1,068 days by pure-bred heifers. The gross cost of rearing of cross-bred and pure-bred heifers upto the age of first calving worked out to Rs. 2,052 and Rs. 2,273 respectively. Comparatively lower cost of rearing in the case of cross-bred was due to shorter period required for maturity and first calving. The share of feed cost, labour cost, miscellaneous cost and veterinary cost in the total cost of rearing of a cross-bred heifer was 80.35, 12.65, 6.36 and 0.64 per cent respectively and the corresponding figures in the case of a pure-bred heifer were 77.15, 12.28, 10.04 and 0.53 per cent. After subtracting the income from dung, the net cost of a cross-bred and pure-bred heifer worked out to Rs. 1,987 and Rs. 2,183 respectively. Taking into consideration the prevailing market prices of Rs. 2,624 and Rs. 2,470 for a cross-bred and pure-bred heifer respectively, the profits or net income worked out to Rs. 637 and Rs. 287 respectively. Separate regression equations were fitted to the data of gross cost (Y) as dependent variable and age of heifer at first calving in days (X) as independent variable. The relationship between X and Y is such that when $X = 0$, Y must be zero, hence the regression line passes through the origin. The values of regression coefficients of equations fitted for cross-bred and pure-bred heifers worked out to 2.6957 and 1.8635 respectively and both were significant at one per cent level. R^2 values of regression equations for cross-bred and pure-bred heifers worked out to 0.98 and 0.95 respectively.

ECONOMICS OF BUFFALO CALF REARING IN HARYANA

Himmat Singh†

Primary data on the cost of female buffalo calf rearing from birth to age at first calving was collected from randomly selected 80 buffalo breeders of the breeding tract comprising Rohtak, Hissar, Jind and Gurgaon districts of Haryana in the year 1977. For the purpose of analysis the period from birth to age at first calving was decomposed into six age groups which were finally integrated into three age groups. The maximum number of calves was found in the age groups of above two years closely followed by 1-2 years. The calves below the age of six months were much fewer in number as compared to calves in higher age groups, indicating a higher mortality rate in the younger calves. Efforts, therefore, need to be made in the direction of providing better feeding regimes, health cover and management to lower the mortality rate and to assess the economic loss to the producers. The average total net cost of rearing from birth to age at first calving was calculated at about Rs. 2,974. Feed cost was the major component of cost accounting for about 72 per cent of the gross cost of rearing. Labour, majority of which was family labour, worked out to be the second largest component of cost, accounting for about 23 per cent. Per day expenses in the age group of 12-24 months were found minimum (Rs. 1.68). It was estimated that every one month increase in the age at first calving cost about Rs. 95, which clearly indicates the importance of reducing the age at first calving. The average age at first calving for the animals included in the study was worked out to be about 43 months which is much higher than the cross-bred cattle. This age may be reduced by adopting better breeding, feeding and management practices. The study concludes that the producer receives about Rs. 2,650 for a buffalo at the time of first calving as against the total cost of rearing of Rs. 2,974. Feeds and labour used for buffalo calf rearing constitute about 95 per cent of the total cost. A major portion of this cost (about 88 per cent) is in terms of producer's own family labour and farm produced feeds which have almost zero opportunity cost to the farmers, particularly on small and marginal farms. Thus, buffalo calf-rearing provides an opportunity to the buffalo producers in the rural areas of the State for economic utilization of surplus family labour and farm produced feeds. In order to supplement the income and employment potential of small and marginal farmers, 'buffalo heifer rearing schemes' at attractive terms of loan advances hold good promise.

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ECONOMICS OF LIVESTOCK AND POULTRY REARING IN HARYANA

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An attempt has been made in this paper (i) to work out the cost of rearing the she-buffaloes, cows (Haryana and cross-bred), bullocks and poultry birds on different categories of farms, and (ii) to study the pattern of livestock and poultry rearing and their contribution to the total farm business income on different sizes of farms. Multi-stage random sampling design was followed. The study comprised a sample of 65 dairy farmers and 20 poultry farmers belonging to different categories. The data with regard to input-output details and incomes were collected from these selected farmers for the year 1978-79. The analysis of data indicated that fodder, concentrates and labour form the major portion of the total cost of rearing the livestock. The cost of rearing the she-buffaloes is highest followed by cross-bred cows, bullocks and Haryana cows. Only medium and large farmers maintain cross-bred cows. The cost of rearing a she-buffalo, cross-bred cow, Haryana cow and bullocks decreases with the increase in the size of holding but the cost of rearing poultry enterprise is reverse. Of the total components of the cost of rearing poultry, maize forms the major portion followed by groundnut cake, wheat bran, labour charges and veterinary expenses. Agriculture and animal husbandry contribute the major portion of the total farm business income in all the categories of farms. The policy implications of these findings are that the Government should provide the necessary input supplies at subsidised rates to the dairy farmers so that these breeds can be reared cheaply and commercially. The necessary infrastructural facilities have to be created for the poultry enterprise for which State Government should take active part and dairy farmers must be educated with regard to the rearing of poultry enterprise. Besides this, the credit institutions should provide credit at subsidised rates specially to the small farmers for rearing the livestock and poultry birds.

COST OF REARING OF CALVES—A CASE STUDY

B. D. Bhole and R. V. Tambat†

The present study was undertaken with the specific objective of estimating the cost of rearing of cross-bred (cow) calves and that of Murrah buffalo calves upto the age of first calving. The area of study was restricted to Punjabrao Krishi Vidyapeeth Dairy Farm, located at Akola. The data on cost of rearing of all the heifers calved for first time during April 1979 to March 1980 were collected from various records maintained at the above said farm. Thus a sample of 12 cross-bred calves and 11 Murrah buffalo calves was selected for this study. The results of the study indicated that the average age at first calving was 997 days in the case of cross-bred calves as against 1,698 days for Murrah calves. It is seen that upto the age of first 180 days on an average 325 litres of milk, 31.50 kg. of concentrates and 974 kg. of roughages were fed to the cross-bred cows. The respective figures were at higher levels for Murrah calves, viz., 340 litres of milk, 32 kg. of concentrates and 1,028 kg. of roughages. On an average (per head), 575 kg. of concentrates and 6,625.50 kg. of roughages were fed to the cross-bred calves as compared to 1,481.61 kg. and 17,914 kg. respectively for Murrah calves.

The average cost of rearing cross-bred calves and Murrah calves was estimated at Rs. 3,282.91 and Rs. 6,328.59 respectively. The cost of roughages appears to be the most important item of cost in both the types of calves, its share being 45.82 per cent and 52.18 per cent for cow and buffalo calves respectively. Next comes concentrates, the share of which was 21 per cent for cross-bred calves and 25.86 per cent for Murrah calves. Though the costs incurred on other items like labour, mineral mixture, salt, medicines and fixed expenses on buildings, utensils, etc., varied for cow and buffalo calves, their percentage shares in their respective total costs were more or less the same for the two types of calves. Thus the overall average cost of rearing of cross-bred and Murrah calves works out to Rs. 3.20 and Rs. 3.62 per day respectively. Thus the costs of rearing appear to be pretty high and as such this programme, particularly in the case of cows, deserves financial support in the shape of subsidy to popularise the same.

THE ECONOMICS OF MILK PRODUCTION BY DIFFERENT TYPES OF MILCH ANIMALS

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A study made recently at the Mahatma Phule Agricultural University, Rahuri, on the economics of milk production gave the following estimates for different categories of animals. The average

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daily and total milk production per lactation of cross-bred cows was 8.68 litres and 2,609 litres. These figures for buffaloes and local cows were 4.13 and 1,359 litres, and 2.26 and 604 litres respectively. The gross income per animal per lactation from cross-bred cows, buffaloes and local cows came to Rs. 5,705, Rs. 2,983 and Rs. 1,367 respectively with the price of milk ranging between Rs. 2 and Rs. 2.30 per litre having a fat content of 4.5 per cent for cow and 7 per cent for buffalo. The average cost of production per litre varied from Rs. 1.60 for cross-bred cow to Rs. 1.89 in the case of buffalo and Rs. 2.52 for local cow. An average cross-bred cow gave a profit of Rs. 1,538 per lactation and 59 paise per litre of milk produced as against Rs. 400 and 29 paise for a buffalo while in the case of the local cow there was a loss of Rs. 162 and 27 paise respectively mainly due to low productivity and prolonged dry period. The total labour requirement of 163 days for buffaloes during the inter-calving period was highest compared to 159 for cross-bred cows and 133 for local cows. This is because the inter-calving period for the buffalo is the highest, *i.e.*, 574 days. However, it was found that the per day per animal labour utilization was highest in the case of cross-bred cows, being 3.18 hours as compared to a buffalo, 2.53 hours and local cow, 2.22 hours. The findings indicated that it is more profitable to follow vigorously cross-breeding programme for improving the potentiality of the local cows. In the case of buffaloes the selection of breeds of high milk yielding type suited for different agro-climatic regions will go a long way in augmenting the present day milk production in the country.

VIABILITY OF MAINTAINING CROSS-BRED COWS AS A FAMILY ENTERPRISE IN MAHARASHTRA

Deepinder M. Vithal*

The scarcity of 'authenticated' cross-bred cows and their extremely high prices have been reported to be the two causes for not adopting the cross-breeding programme. The present study evaluates the viability of cross-breeding of local cows on the entrepreneurs' farms in the rural areas of Maharashtra. The analysis is based on survey data of costs of and returns from maintaining indigenous and cross-bred cows in the Pune and the Aurangabad districts. The study period is the agricultural year 1979-80. The analysis has been conducted separately for the irrigated and the unirrigated areas, owing to a significant net returns to livestock and enterprise from the cross-bred cows. (i) The entrepreneur does not sell any of the female cross-bred calves. (ii) He maintains only two cross-bred cows on the farm. All the male and female calves are sold as and when they attain the age of one and two years respectively.

Over a project life of 13 years, using a discount rate of 11 per cent, the net present value (NPV) of the annual returns remains positive under the first alternative above. For the second alternative the NPV is positive in the case of the irrigated areas. In the unirrigated areas however, it approaches zero at a discount rate of nearly 8 per cent. The reason for this low productivity lies in the lower expenditure being incurred on the maintenance of cross-bred cows in this region. The study recommends that loans should be advanced for the purchase of local cows to cross-breed them through the cross-breeding centres. It also recommends the provision of short-term loans to meet maintenance costs, particularly in the case of the weaker sections in the unirrigated areas. These recommendations may help in bridging the gap between the demand for and the supply of the cross-bred cows in the study region.

ECONOMICS OF MILCH ANIMALS AND FARM SIZE ANALYSIS

H. S. Bal, Rachhpal Singh and H. K. Bal†

This study is an attempt to work out the costs and returns from milch animals and contribution of dairy business income to total business income on different sized farms in Punjab State. The average number of milch animals per farm was 2.93, 4.17, 5.27 and 4.06 on small, medium, large and overall size of farms respectively. The proportional increase in milch animal units was less than that in farm size. The average annual expenditure on milch animals per farm and per milch animal came to be Rs. 2,879.84, Rs. 4,244.58, Rs. 5,885.51 and Rs. 4,260.20, and Rs. 982.88, Rs. 1,017.88, Rs. 1,116.80 and Rs. 1,049.31 in the respective farm size-groups. This production expenditure on milch animals formed 20.89, 19.19, 13.07 and 20.43 per cent of the expenditure on crop production in the respective farm size-groups. The milk yield per farm and per milch animal on an average came to be 2,369.51, 3,602.09, 4,173.58 and 3,325.02 litres, and 809.10, 863.00, 791.95 and 818.97 litres on small, medium large and overall size of farms respectively. Dairy business income on an average was Rs. 1,393.17, Rs. 2,229.32, Rs. 1,698.99 and Rs. 1,747.81 and constituted 15.58, 14.03, 6.38 and 13.16 per cent of total farm business income in the respective

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farm size-groups. The output-input ratio worked out to be Rs. 1.48, Rs. 1.53, Rs. 1.29 and Rs. 1.43 from milch animals and Rs. 1.65, Rs. 1.76, Rs. 1.64 and Rs. 1.70 from crop production in the respective farm size-groups. It showed that crop production was more profitable than keeping milch animals. The findings of this study focus that the contribution of dairy business income to total farm business income was low and the output-input ratio in the case of milch animals was smaller. However, the performance of milch animals was better on medium and small farms. In order to increase farm incomes through diversification of farming with dairy, there is need for genetic improvement of milch animals, their better management and remunerative milk price.

ECONOMICS OF CROP AND LIVESTOCK ENTERPRISES IN BICHपुरI BLOCK OF AGRA DISTRICT OF WESTERN UTTAR PRADESH

Balisher and R. K. Singh*

The present study was conducted in Bichपुरi development block of Agra district of western Uttar Pradesh during the year 1978-79. Its specific objectives were (i) to find out the average number of milch animals maintained on different farm size-groups; (ii) to know the input and output relationship in crop and livestock enterprises on different farm size-groups; (iii) to know the contribution of livestock enterprise in total farm income on different farm size-groups; (iv) to know the problems of farmers in raising livestock enterprise. The study covered 90 farms—48 small, 30 medium and 12 large farms—selected randomly. The data were collected by personal interview method with the help of a set of schedules and questionnaire. The analysis of data showed that the number of milch animals per farm increased while it declined on per hectare basis with the increase in farm size. The percentage area under fodder crops came to 18.47, 11.52 and 10.12 on small, medium and large farms respectively. The overall percentage area under fodder crops was 11.82. The per hectare output from milch animals showed inverse relationship with the size of farms. The output per wet animal was highest on small farms and lowest on large farms. This was probably due to better care of milch animals on small farms as compared to large farms. On an average, fixed cost accounted for 31.38 per cent and variable cost 68.62 per cent in the total cost of maintenance of milch animals. Of all the items of cost, feed cost accounted for about 50 per cent of the total cost of maintenance on all farm size-groups. The cost of feed increased with the increase in farm size while the cost of human labour decreased with the increase in farm size. This was because of the fact that small farms used to graze the animals which reduced the feed cost and increased the labour cost of milch animals on small farms. The per hectare net income for crops was maximum on medium farms and minimum on large farms while for livestock (milch animals) it was maximum on small farms and minimum on large farms. The higher net income from livestock on small farms was mainly due to the fact that farmers in this group cared more for income from milk and milk products as compared to other farms. On an average, the percentage share of crop production and livestock raising in total inputs was 79.47 and 20.53 respectively while the share in the total output of the respective enterprises was 72.16 and 27.84 per cent. The output-input ratio was higher for livestock enterprise as compared to crop enterprise. In the case of livestock enterprise this ratio was higher on small farms as compared to large farms, indicating a better scope for livestock enterprise as a subsidiary occupation on the farms. The major problems reported by the farms which create hindrance in the development of livestock enterprise in the rural areas were the veterinary, lower price of milk, transportation and lack of funds required to purchase feed and fodder for milch animals on the farms.

ECONOMICS OF MILK PRODUCTION IN DIFFERENT BREEDS OF COWS AND BUFFALOES

S. P. Kalyankar†

In this paper an attempt is made to study the economics of milk production in different breeds of cows and buffaloes maintained in an organized dairy farm of Agricultural College, Akola (Maharashtra). The data were collected from the available records with respect to the structure of dairy herd, feeds and fodder, including other items of expenditure and milk production, productivity and average days in milk for each animal in different breeds of cows and buffaloes. The study revealed that only 30.67 and 54.47 per cent of cows and buffaloes were in milk and the rest included dry, heifers, breeding bulls and young stock. Analysis on overall basis showed that feed was the most important item of cost (51.50 per cent) followed by labour (24.73 per cent). Net cost per litre of milk production worked out to Rs. 2.66 on overall basis. A detailed analysis of costs and returns in different breeds of cows and buffaloes showed that the cross-bred cows produced 4 litres of milk per

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day and the days in milk were also highest (*i.e.*, 303 days) as against 3.67 litres of milk per day and 236 days in milk in the case of Sahiwal cows. In buffaloes, Surti and Murrah produced more milk than Berrari breed, yielding 4.29, 4.06 and 3.40 litres per day respectively. The average days in milk were 274, 231 and 228 for these three breeds of buffaloes respectively. Feed, labour, miscellaneous costs and depreciation and deaths of animal accounted for 52.45, 28.82, 1.66 and 1.43 per cent in Sahiwal and 50.79, 17.10, 4.77 and 7 per cent in the case of cross-bred cows. In buffaloes, these proportions were 49.62, 23.81, 2.32 and 8.55 per cent in Surti, 50.65, 24.19, 3.12 and 4.40 per cent in Murrah and 53.69, 26.18, 1.45 and 3.78 per cent in Berrari. The net cost per litre of milk production was Rs. 2.94 in Sahiwal and Rs. 2.82 in the case of cross-bred cows, while it was Rs. 2.06, Rs. 2.18 and Rs. 3.07 for Surti, Murrah and Berrari breeds of buffaloes respectively. The study showed that cross-bred cows are more economical than Sahiwal because the productivity of milk per day is more in the former. The high cost per litre of milk production in Berrari buffaloes is attributed to low milk yield and short duration of lactation period.

A STUDY INTO THE COMPARATIVE ECONOMICS OF MILK PRODUCTION IN URBAN AND RURAL AREAS OF THE PUNJAB STATE

Balwant Singh, I. S. Chatha and Joginder Singh*

The dairy enterprise has been the main focus of attention in the context of diversification of the Punjab agriculture. The dairy farmers in the rural areas rarely give proper consideration to the economics of milk production while the urban dairies are run on commercial lines. The present study was undertaken with a view to examining and comparing the cost structure and relative economics of milk production of the rural and urban dairies. A sample of nine urban and four rural dairy farms was studied with the above objective in view. Detailed information on different cost items for the year 1977 was collected personally from the respondents. The study brought out that the average daily expenditure incurred on feeding a milch animal was much higher in the urban area than in the rural area due to higher proportion of concentrates fed to the animals and higher price of feed and fodder. The major item of cost of milk production was feed which accounted for nearly 70 per cent of the total cost. The fixed cost per litre of milk produced was higher in the rural area than in the urban area due to scale economies of the urban dairies. The seasonal fluctuation in the variable cost of milk production was also examined. The variable costs were the highest during winter months in the urban area and in summer months in the rural area. This variation was mainly due to the seasonal variation in milk yield, availability and price of feed, fodder and labour. The average cost of production per litre of milk for buffalo came to Rs. 1.74 and Rs. 1.71 in the urban and rural dairies respectively while the corresponding figures for a cow worked out to be Rs. 1.57 and Rs. 1.70. Although not much difference in the cost of production of milk in both the areas was observed, yet the profitability aspect varied widely. The per litre net returns of Re. 0.71 and Re. 0.85 were observed in the case of buffalo and cow milk respectively in the urban area. However, there was a profit of Re. 0.13 per litre in the case of buffalo milk and a loss of Re. 0.27 per litre in the case of cow milk in the rural dairies. To improve the economics of rural dairies, the marketing system of milk needs to be streamlined.

COSTS AND RETURNS OF DAIRY ENTERPRISE IN PONDICHERY STATE

C. Arputharaj and R. Rajagopalan†

Making use of the data of a sample of 90 milk producing households in Pondicherry State, costs and returns of dairy enterprise for different categories of farms are examined. Also, the price of milk is analysed in relation to its cost of production. The total cost per milch animal unit was higher for the big and medium farmers than for the small farmers and landless labourers. The total paid-out cost was the least in the case of the small farmers. Fodder and feed were the principal items of cost and labour was the next major item. Big farmers had the highest gross income per milch animal unit, followed by medium farmers, small farmers and landless labourers in that order. Only the big farmers made any significant profit in relation to the total cost. Small farmers just managed to cover the cost. Medium farmers and landless labourers incurred losses in respect of the total cost. All the categories gained in relation to paid-out cost and cost A. When related to cost B, only the medium farmers were losing. The total cost per litre of milk was the highest for the landless labourers and the least for the small farmers. Considering the average price paid by the co-operatives for milk and costs of production per litre, all the categories were incurring loss in the case of the total cost. Only in relation to the paid-out cost all the categories were gaining substantially. Production function analysis showed that an increase of one rupee worth of feed led to an increase of 0.68 litre of milk, the value of which at the price paid by the co-operatives would be 95 paise only. So, unless the price paid for milk, especially by the co-operatives, is sufficiently enhanced, the dairy farmers would not be interested in striving for higher milk production levels.

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A COMPARATIVE ECONOMICS OF MILK PRODUCTION ON GOVERNMENT AND PRIVATE DAIRY FARMS IN DISTRICT KANPUR

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The paper examines the comparative economics of milk production on government and private dairy farms in district Kanpur during 1979-80. Government dairy of Chandra Shekhar Azad University of Agriculture and Technology, Kanpur and a private dairy, Sardar Dairy Gumati No. 5 at Kanpur were selected for the study. The data were collected from the records maintained on both the dairies. The net cost of milk production per litre was Rs. 1.93 for a cow and Rs. 2 for a buffalo on government dairy while it was Rs. 1.94 and Rs. 2.25 per litre respectively on private dairy. It showed that the cost of milk production per litre was higher on private dairy because of higher expenditure on feeds. The cost of fodder for cow and buffalo on government dairy accounted for 42.91 per cent and 43.4 per cent of the total cost of milk production respectively, while on private dairy it came to 43.53 per cent and 44.90 per cent respectively. The cost of concentrates for cow and buffalo on government dairy came to 32.81 per cent and 34.04 per cent while on private dairy it accounted for 31.54 per cent and 35.66 per cent respectively. It showed that on government dairy balanced diet was supplied. Labour employment on government dairy for a cow and a buffalo worked out to 10.88 and 11.32 per cent respectively and it was 11.74 and 9.72 per cent respectively on private dairy. It indicated that labour employment on government dairy was regular while on private dairy it was irregular. The net income from cow and buffalo milk production on government dairy formed 27 per cent of the total income. It is concluded from the study that the feed cost on private dairy farm was higher than that on government dairy. The private dairy has no proper and timely supply of good quality of fodder and concentrates for milk production while on government dairy these were available. It is emphasized that the private dairy should be maintained on the lines of the government dairy farm, so that the better milk yield and better labour employment may be obtained.

ECONOMICS OF MILK PRODUCTION OF CROSS-BRED COWS IN AHMEDNAGAR DISTRICT (MAHARASHTRA)

S. D. Suryawanshi, P. M. Kapase, R. G. Patil and S. J. Patil†

The present investigation is undertaken to know the comparative economics of cross-bred cows vis-a-vis local cows and buffaloes. The important objectives of the investigation are to study the maintenance costs, profitability and break-even price and break-even level of milk production of different categories of animals. The data were collected from 26 villages of four tahsils, viz., Shrirampur, Kopergaon, Sangamner and Rahuri of Ahmednagar district, where cross-bred animals were mainly concentrated. In all 213 cross-bred cows, 50 local cows and 30 buffaloes were selected for the study. The data were collected by survey method for the year 1979-80. The study revealed that the per day maintenance cost was highest in the case of Holstein 75 per cent (Rs. 13.07), followed by Jersey 75 per cent (Rs. 12.55), Holstein 50 per cent (Rs. 11.44), Jersey 50 per cent (Rs. 9.70), buffalo (Rs. 8.30) and local cow (Rs. 4.53). This showed that among the cross-breeds the maintenance cost was higher with the higher percentages of blood groups. With the higher maintenance costs, the cross-bred cows also gave higher milk production. Holstein 75 per cent gave highest milk yield (2,730 litres) per lactation, followed by Jersey 75 per cent (2,634 litres), Holstein 50 per cent (2,394 litres), Jersey 50 per cent (1,991 litres), buffalo (1,593 litres) and local cow (861 litres). As regards net profit per animal, a similar trend was observed as in case of milk yields indicated above. The output-input ratios in Holstein 75 per cent, Jersey 75 per cent, Holstein 50 per cent, Jersey 50 per cent, buffalo and local cow worked out to 1.17, 1.16, 1.15, 1.14, 1.04 and 1.03 respectively. The break-even analysis showed that the cost of production of milk in the cross-breeds varied from Rs. 1.76 to 1.81 per litre while it was Rs. 2.03 and Rs. 2.17 in the case of local cows and buffaloes respectively. It thus indicates that the prevailing milk prices are not remunerative to those maintaining local cows and buffaloes. It was seen that Holstein 75 per cent, Jersey 75 per cent, Holstein 50 per cent, Jersey 50 per cent, buffalo and local cow should yield 7.7, 7.5, 6.9, 5.8, 4.9 and 3.6 litres of average milk per day respectively. At this level only, they will cover the maintenance cost; but below this level, it will not be profitable to a dairyman. It is suggested that the farmers should be advised not to maintain uneconomical animals, giving yields below break-even production level. Extension efforts are needed to educate the farmers regarding proper feeding and management of livestock. The available stock can be improved by cross-breeding programmes so that the producers will gain good profit and consumers will pay less milk prices.

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AN ECONOMIC ANALYSIS OF MILK PRODUCTION BY DIFFERENT BREEDS OF MILCH CATTLE ON VARIOUS SIZES OF FARMS IN JAUNPUR DISTRICT OF EAST UTTAR PRADESH

D. K. Singh*

This paper attempts to work out the economics of milk production of different breeds of milch cattle on different sizes of farms. This study was conducted during 1978-79 and covered 50 households owning milch cattle selected from different sizes of farms in Jaunpur district of East Uttar Pradesh on the basis of probability proportional to their number. The study revealed that (i) at an aggregate level, the cost of maintenance per lactation of a local cow, cross-bred cow, local buffalo and Murrah buffalo was Rs. 772, Rs. 1,485, Rs. 2,475 and Rs. 3,351 respectively, yielding a gross income of Rs. 850, Rs. 1,754, Rs. 2,828 and Rs. 4,106, (ii) The average milk yield per day of a Murrah buffalo was 4.50 litres as compared to 2.80 litres of a cross-bred cow; while the yield from a local cow and buffalo was 1.80 litres and 3.10 litres respectively. (iii) It is also evident that as the level of production increases the cost of production of milk goes up. The net maintenance cost per day of a Murrah buffalo worked out to Rs. 8.95 as against Rs. 4.60 for a cross-bred cow. The cost of feeds per litre of milk on an average for a cross-bred cow, local cow, Murrah buffalo and local buffalo worked out to Rs. 1.64, Rs. 1.83, Rs. 1.99, and Rs. 2.18 respectively. Due to higher milk producing capacity of cross-bred cows and Murrah buffaloes, the cost of feeds per litre of milk was comparatively lower than their counterparts. Though the feed cost per litre of milk for a Murrah buffalo was higher, the feed cost per rupee of milk was lower than that for a cross-bred cow because of relatively higher price of milk of a Murrah buffalo. The Murrah buffalo and cross-bred cow gave a net income of Rs. 480 and Rs. 179 respectively per lactation. However, the net income per lactation from a local cow and buffalo was only Rs. 18 and Rs. 136 respectively. The farm business income from a Murrah buffalo was highest (being Rs. 755), followed by a local buffalo (Rs. 353), cross-bred cow (Rs. 269) and local cow (Rs. 73). The farmers operating holdings between 5 and 10 acres each had received higher yield and more income at minimum cost in comparison to the other categories of farmers due to better management of feeding and breeding of milch cattle. To make the white revolution successful, the local breeds of cows and buffaloes will have to be substituted by cross-bred cows and Murrah buffaloes respectively along with better management of feeding and provision of good cattle housing facilities.

ECONOMICS OF MILK PRODUCTION IN THE URBAN AREA OF PUNJAB WITH SPECIAL REFERENCE TO LUDHIANA CITY

Balwinder Singh†

From the policy angle, the cost and returns structure on the urban dairy farms is an important aspect for the producers, consumers and the policy makers. This study was, therefore, directed to examine the cost of production of milk and to examine the profit margins on small, medium and large dairy farms. All the dairy farms of Ludhiana city were classified into small, medium and large categories using the cumulative frequency distribution method and from each category, the dairy farms were randomly selected according to the probability proportional to the number of animals on the farms. The study showed that the small dairy farms registered the highest yield per animal among all the categories. The fixed costs per animal showed a negative relationship with the farm size. The variable costs were higher on small dairy farms as compared to the medium and large dairy farms. The study revealed negative relationship between dairy farm size and per animal returns to variable capital, to labour, capital and management, to labour and management and to family labour and management. However, the returns to management (per animal) varied positively with the farm size. The analysis showed that the per litre cost of milk production decreased as the size of dairy farms increased. To improve the returns to various factors, the study suggested a quantitative reduction of concentrates and increase of fodder.

ECONOMICS OF MILK PRODUCTION IN A TRIBAL AREA OF HIMACHAL PRADESH: A COMPARATIVE STUDY OF LOCAL, CROSS-BRED AND JERSEY COWS

V. K. Singh‡

The study is based on information collected from 148 households of village Kothi in district Kinnaur, Himachal Pradesh. The entire district is backward in all respects and from all standards.

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Population is sparse consisting of people of scheduled tribes and scheduled castes. Agricultural development in this area suffers from several constraints including extremely cold and dry climate, very small holdings of shallow and stony soil, tiny sloping fields, ignorance and poverty of the people, etc. Almost every household maintains a few cows to meet its demand for milk. Most of the cows in the village are of local breed which are poor milk yielders. Recently cross-breeding with male yak has started and is becoming popular. Jersey cows are also being supplied by the government. The number of livestock as also the cows per unit of land was found to be decreasing with an increase in the size of holding. The average cost of maintenance per cow and per litre of milk produced increases with an increase in the size of holding. The proportion of felt costs in the total costs also increases with an increase in the size of holding but the per litre cost declines for reasons of increased milk yields in larger holdings. The average cost per litre of milk produced is significantly higher in the case of local cow but there is very little difference in this cost between the cross-bred and Jersey cows.

Milk is the main product from cows and accounts for 93 to 97 per cent of the total income from these animals. The only other product is the dung which is used for manuring the fields. Though the amount of net income from local cows is very small, it provides sizable employment to the family members. Such figures are much higher for cross-bred and Jersey cows. The ratio of felt costs to output decreases with an increase in the size of holding but reverse is the trend in the case of imputed costs. Shortage of fodder being the main hurdle in livestock development, any programme in this direction must include development of pastures, leaf fodder and crop husbandry. Cross-breeding of local cows with yaks must be given priority over the supply of Jersey cows as the latter cannot compete with the former in the area unless total stall feeding can be arranged, the possibilities of which are remote in the near future.

ECONOMICS OF LIVESTOCK RAISING ON FARMS OF DIFFERENT SIZES AND THEIR CONTRIBUTION TO GROSS FARM INCOME IN DISTRICT UNNAO, UTTAR PRADESH

Anant Ram Verma and S. P. Tewari*

Based on an intensive enquiry of 100 farmers, selected randomly from ten villages of two blocks, namely, Bangarmau and Ganj Muradabad in district Unnao, this study seeks to examine the contribution made by livestock production to the total farm business income. The farmers were selected from four size-groups, viz., 0-1, 1-2, 2-3 and 3 hectares and above. The data were collected by survey method during the agricultural year 1978-79. The cows and she-buffaloes were the main milch animals maintained by the farmers in the study area. The crop husbandry in the area is unthinkable without livestock which provides farmyard manure to maintain the fertility of the soil. The milch animals maintained on the sample farms are generally of poor breed and are not fed properly which resulted in their low productivity and returns. A cow, on an average, yielded 655.86 litres of milk during a lactation, which was valued at Rs. 1,311.72. An average net income of Rs. 258.91 per lactation was obtained from a cow. An increasing trend was observed in the yield and net income on larger farms. Better feeding and breeding on larger farms resulted in higher yields and returns per cow on these farms. The cost of production per litre of cow milk, on an average, worked out to Rs. 1.60 which was slightly higher on small sized farms due to lower yield per cow. The average input-output ratio is estimated at 1:1.25 which was a little higher on larger farms because of relatively higher yield per cow. A she-buffalo, on an average, yielded 981.05 litres of milk per lactation, which was valued at Rs. 2,452.62. The average net income from a she-buffalo came to Rs. 584.97 per lactation. The per lactation yield and value of net income for a she-buffalo were higher on large sized farms due to the fact that they could afford to maintain better breeds of she-buffalo and higher investment on fodder, concentrates, etc., which in turn resulted in higher yield and net income. The average cost of production per litre of she-buffalo milk worked out to Rs. 1.90 which was a little higher on small sized farms because of relatively low yield per buffalo. The input-output ratio, on an average, worked out to 1:1.31 which was higher on larger farms because of relatively higher yields obtained from a she-buffalo on these farms. A comparative economic analysis of cow and she-buffalo revealed that she-buffaloes gave higher return as compared to cows, because of their superiority in giving higher milk yield. The cost of production per litre of she-buffalo milk was higher than that of cow milk because of higher maintenance cost.

As regards the contribution made to gross farm income and expenses, it was observed that, on an average, livestock contributed 21.65 and 24.19 per cent respectively as against 78.35 and 75.81 per cent respectively by crop production. The contribution of livestock production to the gross farm income was higher on the smallest size-group than on the largest one because of smaller number of milch animals per farm as compared to larger holdings as well as due to tiny size of farm.

Analysis of the relationship between crop and livestock production by fitting quadratic form of production function showed positive and significant complementary relationship between the two enterprises, the value of the gross crop output rising with successive increases in the value of gross

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livestock output. Both these values are low on farms of smaller sizes, which shows clearly that, whereas there is not much scope for increasing the land base on small farms, either through purchase or leasing in, such farms would be well advised to devote more energy and resources including funds in strengthening their livestock production programmes as a strategic way of increasing crop production from their land base.

AN ECONOMIC ANALYSIS OF DAIRY ENTERPRISE IN BANGALORE DISTRICT, KARNATAKA

T. R. Keshava Reddy, J. V. Venkataram and S. Suryaprakash*

The study is an attempt to estimate the economics of dairy enterprise and its employment potential among small, medium and large farmers of Bangalore district, Karnataka. The sample includes 24 farmers from each category who were members of the Dairy Co-operative Societies in the district. Detailed information on the cost of purchase of dairy animals and cost of maintenance of animals including the cost of feed, concentrates, labour, etc. was obtained. The results revealed that the purchase price of the dairy animal was the lowest for small farmers and the highest for large farmers. Between animals, a cross-bred cow cost the maximum followed by a local buffalo and local cow. The cost of maintenance (fixed and variable costs) per cross-bred cow, local cow and local buffalo was Rs. 2,339, Rs. 1,198, and Rs. 1,535 for small farmers, Rs. 2,658, Rs. 1,126 and Rs. 1,433 for medium farmers and Rs. 2,628, Rs. 1,055 and Rs. 1,372 for large farmers respectively. In general the fixed cost as a proportion of the total cost varied between 17.49 and 28.58 per cent. It was observed that the cost of maintenance, gross returns and net returns were maximum for a cross-bred cow for all the three types of farmers followed by local buffalo and local cow. The net returns were maximum (Rs. 1,318.48) for large farmers and the least (Rs. 1,086) for small farmers per cross-bred cow per lactation. In the case of a local cow, large and medium farmers realised a net return of Rs. 243 as against Rs. 201 realised by small farmers. The net return for a local buffalo was maximum for medium farmers (Rs. 327) and the least for small farmers (Rs. 264). The total milk yield per lactation was the highest for a cross-bred cow followed by a local buffalo and a local cow.

The lactation period per animal reflects the possible employment potential for human labour and the labour employed for the maintenance of a cross-bred cow was 106 man-days for small farmers, 111 man-days for medium and 92 man-days for large farmers. The return per rupee of investment was the highest (Rs. 1.50) from a cross-bred cow for large farmers and the lowest was from a local cow (Rs. 1.17) for small farmers. Thus, it is concluded that the cross-bred cows are superior to the local cows and local buffaloes both in terms of continuous income and employment potential.

MILCH CATTLE—CRITICAL TO ANTI-POVERTY RURAL DEVELOPMENT PROGRAMME

Harpal Singh and R. P. Sinha†

Our achievements, both in agriculture and rural development, are overshadowed by the continued existence of conditions of extreme poverty and deprivation among the masses in general and rural people in particular. The sectoral development approach to growth, based on land, invariably leaves outside its ambit, a large proportion of rural poor who consist of marginal farmers, artisans and other landless. Consequently, the rural poor do not derive much benefits from the implementation of land-based developmental programmes and projects. This underscores the need for formulating and implementing strategies based on non-land resources which are more widely distributed and owned, for ensuring a more equitable distribution of the incremental benefits and incomes. 'Land' is more unevenly distributed than 'milk animal'. A development approach which is based on 'milk animal' is thus likely to distribute the benefits in a more equitable way and would help secure the participation and involvement of even those who are landless or have a very small piece of land. An attempt has been made here to study the suitability and economics of crop and milk production for pursuing future development strategies for the upliftment of rural poor. The study reveals that human labour elasticity of milk production is higher than that of crop production. Milk production activity makes less use of hired labour than crop production and the former can provide greater opportunities of employment for children and women in the family. Milk production, however, ensures only modest profit over paid-out cost. Dairy extension, finance, arrangement for the sale of milk, etc., offer scope for improvement of income from milk production. The paper thus pleads for adopting a 'milk animal' as against a 'land' based approach to reduce poverty among the poorest in the rural areas.

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INPUT-OUTPUT RELATIONSHIP IN MILK PRODUCTION AND EMPLOYMENT POTENTIAL—A LIVESTOCK ENTERPRISE IN HARYANA

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In this paper an attempt has been made to study the livestock enterprise in the rural areas of Haryana in relation to input-output of milk enterprise and employment potential therein. The family budget inquiry conducted during 1977-78 forms the basis of this study. The sample study covered 81 cultivators who held 24 cows and 138 buffaloes. In Haryana, the farmers generally maintain milch cattle for non-commercial purposes. The average maintenance cost (input) of a cow and a buffalo in 1977-78 was Rs. 860.50 and Rs. 1,623.22 respectively. The variable cost constituted four-fifths of the total cost. Roughages and concentrates were the main items of input accounting for 60 per cent of the total cost of milk production. The fixed cost accounted for one-fifth of the total cost. The average annual milk production of a cow and a buffalo was 5.98 quintals and 10.26 quintals respectively. The average cost of milk production per quintal in respect of a cow was Rs. 143.85 and Rs. 158.25 for a buffalo.

The output of milk enterprise comprises milk yield, young stock, dung and dung cakes. Milk yield accounted for 90 per cent of the total income from this enterprise. The average annual output of a cow and a buffalo in 1977-78 worked out to Rs. 1,005.17 and Rs. 1,906.30 respectively. The study has revealed that the input-output relation for a buffalo was Rs. 1,623 and Rs. 1,906, thereby yielding a net gain of Rs. 283 per annum. Similarly, in respect of a cow the net gain was Rs. 145 per annum. The net profit per kg. of milk works out to 24 paise and 28 paise for a cow and a buffalo respectively. The net income per household from this occupation was Rs. 545 during the year 1977-78. The inquiry has further revealed that on an average, 1.36 and 2.40 man-hours were spent per day for maintaining a cow and a buffalo respectively. The milch cattle owners opined that if dairying is adopted as full-time profession, it requires 2.40 and 4.00 man-hours per day for a cow and a buffalo respectively. It is estimated that 4.02 lakh persons were engaged in Haryana during 1977-78 in dairy farming. If this occupation is followed on commercial lines in the State, it is projected to give full-time employment opportunities to an additional 2.13 lakh persons in the State.

ECONOMICS OF LIVESTOCK PRODUCTION IN RELATION TO ITS CONTRIBUTION TO THE GROSS FARM INCOME AND EMPLOYMENT IN DISTRICT FARRUKHABAD (U.P.)

S. D. Singh Sengar, B. K. Gupta and P. D. Misra†

A study on the economics of livestock production in relation to its contribution to the gross farm income and employment on the farms in Umerda block in district Farrukhabad, Uttar Pradesh was undertaken in 1978-79. The results were based on an intensive inquiry of 50 farmers selected randomly from five size-groups of holdings, viz., 0-1, 1-2, 2-3, 3-4, and 4 hectares and above. The study was conducted by survey method. It revealed that on an average, out of total employment of 231.01 days per hectare, livestock production contributed 28.14 per cent. The average gross farm income and expenses per hectare came to Rs. 4,991.22 and Rs. 3,553.88 respectively, out of which livestock production contributed 28.57 per cent to the total farm income and 29.48 per cent to the farm expenses. The percentage contribution made to total farm income, expenses and employment by livestock production was higher on small farms as compared to larger sized farms. The study clearly indicated that there existed a complementarity between crop and livestock production on the sample farms. This complementarity was more prominent on the small farms with low land base. Efforts are needed to increase the livestock production by better feeding and breeding programmes on these farms to raise the level of income and employment of the farms in general and that of small farms in particular.

MILK PRODUCTION WITH CROSS-BRED COWS—A MICRO ANALYSIS

G. Rangarajan, C. Ramaswamy and V. Puhazhendhi‡

Dairying is considered to be an important source of income to the rural households of India. The need of the day is the improvement in the productive capacity of our stock through upgrading and efficient management of milk production units. The main objective of this study is to analyse the economics of milk production from cross-bred cows and non-descripts in terms of yield, cost of

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milk production, net income realised by the farmer, employment generation and resource use efficiency in rural Periyar district of Tamil Nadu. The study was conducted in 1978-79. The main findings of the study show the superiority of cross-breds in all the above-said aspects. The cross-bred cows yielded an additional quantity of 924 litres with an additional lactation period of 40 days over that of the non-descriptors. The cost of milk production per litre was low for cross-breds (Rs. 1.04) and high for non-descriptors (Rs. 1.39). Though in absolute terms, the cost is high for cross-breds, the unit cost is low for them. The major component of cost item is feeds and fodder, constituting nearly 50-70 per cent of the gross cost in both the breeds. The net return realised per cow was nearly Rs. 640 for cross-breds and Rs. 8.52 for non-descriptors per annum. The cross-breds generated employment for 50 standard man-days whereas non-descriptors generated nearly 54 standard man-days per cow per year. The production functions estimated separately for cross-breds and non-descriptors revealed that the quantity of concentrates fed to animals, value of animal and managerial ability showed a positive relationship with the milk yield in both the functions. Total digestible nutrients (TDN) supplied by roughages and the amount of labour applied exhibited a negative relationship with milk yield. The availability of farm produced roughages and supply of family labour made the milk producers to apply those inputs a little more than what is required. The economic optimum for application of concentrates worked out to 1,532.99 kg. TDN per year in the case of cross-breds as against 466.9 kg. for non-descriptors. However, the marginal value productivities for these variables were much higher for cross-breds. The study calls for efforts to increase the managerial ability of the farmers for efficient use of the resources; to develop the genetic potentials of the milch animals; and to provide financial and technical aid to the farmers to boost milk production in the study area.

ECONOMICS OF LIVESTOCK ENTERPRISE IN HIMACHAL PRADESH

Amar S. Guleria*

This study of two sub-aggregates 'Livestock and Crop' of the aggregate economy of the farm output was undertaken in the Mandi district of Himachal Pradesh. The study of a sample of 52 farmers in the Sundernagar block of the district points out that the number of unproductive livestock is inversely related with the sizes of farms. The large number of adult cattle units in smaller holdings reduces the profit margin of the farm business. In all sizes of farms, on an average, milch animals accounted for over 36 per cent of the total cattle stock, where the proportion of the milch cows was over 51 per cent of the total milch cattle stock. Therefore, amongst the milch animals, cows were considered more important. Interestingly none of the farmers in the sampled households possessed cross-bred animals. Sheep and goats were generally kept by the marginal and small farmers to a larger extent. These were reared for wool and meat production only.

On an average, the per cent distribution of expenditure on labour, capital, feeds, and other items was 59, 7, 33 and 1 per cent respectively for buffaloes. The corresponding figures for cows were 74, 4, 20 and 3 per cent. And in the case of sheep and goats, these expenses were 87, 8, 3 and 1 per cent. Owing to the geographical, climatic, and social conditions in the region, higher labour costs need not be surprising. However, cows, and sheep and goats are ill-fed compared to buffaloes in the sampled sizes of farms. On the basis of comparative study of buffaloes, cows, and sheep and goats, it was observed that the expenditure on feed was profitable in the case of sheep and goats and cows to such an extent that the gross income increased by 220 and 82 per cent respectively. In the case of buffaloes, such expenses accounted for only 51 per cent increase in the gross revenues. More importantly, the comparative study of different cattle units revealed that the expenditure on capital cost of buffaloes, cows, and sheep and goats was profitable resulting in an increase in the gross income by 836, 27 and 777 per cent respectively. On the contrary, the expenditure on cattleshed and related equipments was a source of loss in the case of sheep and goats, and buffaloes; and productive in the case of cows to such an extent that the gross income from cows increased by 181 per cent; and in the case of buffaloes, and sheep and goats it decreased by 1058 and 217 per cent of the additional expenditure on cattleshed and livestock rearing equipments respectively. This brings out the need for the reorganization of the farms in the direction of increasing the productivity of sheep and goats, and cows through greater investments in their feed and forage. All this, in turn, would involve a strict control over their numbers relative to the size of farms. Reorganization of the farms may further be improved through a greater investment on capital cost mainly in the case of buffaloes, and sheep and goats.

RELATIVE ECONOMIC EFFICIENCY OF RESOURCES IN MILK PRODUCTION IN PUNJAB

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This study is based on the input-output data of milk production collected through cost accounting method under the project, "Comprehensive Scheme for Estimation of Cost of Cultivation of Principal

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Crops in Punjab", for the year 1974-75. A sample of 118 farms was categorised into small (less than 4 hectares), medium (4 to 8 hectares) and large (8 hectares and above) farms comprising 48, 39 and 31 farms respectively. The results of the Cobb-Douglas production function revealed that concentrate mix was the most important factor followed by green fodders intake significantly influencing milk output on all categories of farms. The production elasticity for human labour was significantly negative on small farms but significantly positive on large farms. The study showed that the small farmers made over-investment in rearing and raising milch animals relative to their farm size capacity. The marginal value productivity of concentrates was the highest for pooled farms followed by medium farms and almost equal on small and large farms. The productivities of human labour employment and capital invested on milch animals were both positively related and that of investment on sheds and equipment was inversely related with the farm size. The small farmers have disproportionately made excessive use of most of the inputs in producing milk. This type of maladjustments needed to be corrected through reallocation of resources by withdrawing expenditure from inputs of lower productivity and extending it on inputs of higher productivity. The analysis of marginal rates of substitution showed complementarity between the two maintenance feed inputs, *i.e.*, dry and green fodders on small, medium and pooled farms and between concentrates and dry fodders on the former and the latter farms. While substitution possibilities between these three kinds of intake existed on large farms, they, however, experienced complementarity between human labour use and fixed capital inputs. The degree of substitution of human labour for fixed capital on milch animals increased with an increase in the farm size. The findings of this study have far-reaching implications regarding allocation of the existing resources for promoting milk output. Efficient methods of management and appropriate feeding schedules could help to maximize profits from milk production in the mixed farming situation, particularly on the Punjab farms and generally across the Indian farms.

LIVESTOCK AND RURAL DEVELOPMENT

S. Varadarajan and N. Srinivasan*

As a source of income and employment in the rural areas, livestock production is growing in importance especially with recent interest in integrated rural development. With strong linkages with other sectors, it would also increase employment opportunities in other sectors. But it is likely that livestock production may become competitive to crop production and the trade-off between them becomes critical in the context of overall growth of the rural economy. To understand these problems a study was conducted in a compact area of three villages in Tiruchirapalli district in Tamil Nadu. The data related to the agricultural year 1979-80. The results show that mixed farming is more common than pure crop farming and pure livestock farms are rare to find. Livestock production uses, on an average, 280 days of labour per farm per year. On per animal, family labour contributes about 80 per cent of total labour used. In value terms the cost of labour per animal per day was 65 paise of which 50 paise worth of labour was the share of family members. Thus vast employment potential of livestock enterprise was observed to exist, even at the current level of livestock production. An attempt is made to determine the optimal mix of crop and livestock enterprises by applying the rule of equi-marginal productivity of the most critical factor, namely, labour. The results indicated that livestock production was at sub-optimal level and that implied scope for further expansion of the enterprise. The marginal product of labour was above its average product, indicating scope for intensifying livestock production. Further functional analysis revealed that better feeding and better breeding practices would significantly contribute to increase in returns to investments in livestock and with it additional employment opportunities. An opinion survey with farmers indicated a gap between awareness and adoption about artificial insemination to cattle. To bridge the gap strengthening of key village centres was recommended.

ECONOMIC ANALYSIS OF DAIRY ENTERPRISE WITH DIFFERENT CROSS-BRED COWS

C. B. Singh and V. M. Rao†

The paper attempts to examine the production traits, cost of milk production and income from different cross-bred cows, *viz.*, Holstein × Local (HL), Brown Swiss × Local (BL) and Jersey × Local (JL) owned by the urban households of Karnal city. An effort is also made to study the various factors influencing milk production in different seasons and work out the marginal productivities of important factors. Stratified random sampling technique was followed to select 150 households owning different cross-bred cows. The study revealed that the productivity of HL crosses was higher

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than other cross-bred cows resulting in lower cost of milk production in different seasons and higher net annual income (Rs. 1,141). It was observed that the coefficient of digestible crude protein (DCP) variable was positive and statistically significant in all the seasons for all the breeds except JL cows in the summer season. This indicated that there is considerable scope for increasing milk production through feeding more of DCP particularly in the form of protein rich green fodders like maize + cowpea in the summer and rainy seasons and berseem in the winter season so as to reduce the cost of milk production. This view was also supported by the positive marginal value products of DCP in different seasons. The negative coefficients and marginal value products of digestible non-protein nutrients (DNPN) in the rainy season for BL cows and in the winter season for JL cows suggested that over-feeding of DNPN through wheat straw in the respective seasons to these cows should be reduced. It was noted that labour had a seasonal significance as indicated by its positive marginal products in certain seasons. This indicated that incorporation of dairy enterprise by low income households in the study area can increase labour productivity and family incomes.

INPUT-OUTPUT RELATIONSHIP IN BUFFALO MILK PRODUCTION IN MARATHWADA REGION OF MAHARASHTRA

B. W. Ashturkar, V. G. Khelge, L. V. Ambegaonkar and C. D. Deole*

We have very scanty reliable data about the input-output relationship in milk production in the Marathwada region. The present study was undertaken with a view to examining the cost of production of buffalo milk and to find out the input-output relationship and resource efficiency. The study is based on a sample of 60 milk producers from Udgir taluka of Osmanabad district. The data collected with the help of a pre-tested questionnaire were analysed by using the usual cost concepts of cost 'A', cost 'B' and cost 'C'. It is revealed from the study that out of the total cost, about 86 per cent is incurred on items under cost 'A', about 7 per cent on cost 'B' and remaining 7 per cent on cost 'C'. The expenditure incurred on feeds and fodder accounted for about 66 per cent of the total cost. The average lactation period per buffalo worked out to 194 days. The average income per buffalo per annum including the value of by-product amounted to Rs. 1,663. The net income per buffalo per year came to Rs. 303. The input-output ratio thus obtained is found to be 1:1.22. Statistical analysis of the data with the help of the Cobb-Douglas production function indicated that green fodder significantly will increase the milk yield as also the concentrates. The resource efficiency of green fodder is 0.1965 and that of concentrates is 0.5533, indicating that the producers should increase the use of these inputs by 19.65 per cent and 55.33 per cent respectively.

LEAST COST FEEDING OF DAIRY COWS IN HIMACHAL PRADESH

G. D. Vashist†

The availability of feeds and forages at economical rates mainly determines the success or otherwise of dairy development programmes as feed costs alone account for approximately 70 per cent of the total cost of maintaining dairy animals. It is, therefore, necessary that the dairy ration costs the least to enable the dairy enterprise to compete economically with other enterprises. This study was undertaken with two objectives, namely, (a) to work out the least cost combination of different feed and fodder elements in a balanced ration for dairy cows; and (b) to compare the ration so obtained and costs involved with the ration being presently used at the Indo-New Zealand Livestock Improvement Project farm, Palampur. Linear programming technique was applied to obtain the optimum solution. In *rabi* the optimal ration was composed of 4.600 kg. of gram *chuni*, 12.300 kg. of oats/barley (green) and 2.800 kg. of paddy straw/wheat straw/maize straw/grass hay. Likewise, in *kharif*, the ration consisted of 4.600 kg. of gram *chuni* and 20 kg. of local green grasses. The cost of ration was Rs. 4.99 and Rs. 4.30 in *rabi* and *kharif* respectively. A comparison of the optimal concentrate ration with the concentrate ration presently being used at the Indo-New Zealand Livestock Improvement Project farm revealed that there appeared a scope to reduce the cost of the ration at this farm by about 29 per cent by a proper adjustment of the feed stuffs.

POTENTIALITIES OF LIVESTOCK ENTERPRISES ON UNIRRIGATED SMALL FARMS IN THE GOBARDHANA BLOCK OF ASSAM

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The study was taken up in 1979-80 with a view to examining the potentialities of livestock enterprises (dairy and poultry) by developing risk efficient production plans in respect of production

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policy alternatives like crop farming, crop-dairy farming, crop-poultry farming and crop + dairy + poultry farming. The study sample was selected following the two-stage random sampling technique, the villages forming the first while the operational holdings the second stage of sampling. This provided a random sample of 35 unirrigated small holdings for the present investigation. The risk efficient production plans were derived for the improved level of technology by parametric risk programming technique using the MOTAD model. The study brought out that on unirrigated small farms in Gobardhana block of Assam, the crop+dairy+poultry farming was the best production policy alternative from the viewpoints of both the risk averters and the risk preferers. The other production strategies in order of profitability and stability of farm incomes turned out to be crop+poultry farming and crop+dairy farming. The crop farming alternative was found to be the least profitable.

INCOME AND EMPLOYMENT POTENTIAL OF DAIRY ENTERPRISE ON MIXED FARMS

R. K. Singh*

The study was undertaken to explore the potentiality of dairying in augmenting income and employment through proper organization and integration of milch animals along with crop cultivation on mixed farms of Etah district of Uttar Pradesh. The relevant farm data for the study was collected from 60 farmers selected randomly following three-stage random sampling frame. For finding out the economic feasibility of dairy enterprise optimal farm plans were developed following linear programming technique. The results of the study revealed that dairying is profitable and the farmers can easily earn an additional one and a half to two thousand rupees per annum through integration of milch stock besides their earning from crop cultivation. Though this amount may be considered small for big farms, but for small and marginal farms it is a handsome gain. The rearing of milch stock, apart from providing additional source of income, also provided a source of additional employment for the farm family. Though on medium and large farms the possibilities of increasing employment existed on both counts, *i.e.*, crop cultivation and dairying, on small and marginal farms such possibilities were exhibited through the integration of dairying only. Among the two breeds Murrah and *Desi* buffaloes considered, Murrah was found to be better convertor of feeds and fodder into milk and thus more profitable than the local stock. With regard to different feeding practices considered, the practice of feeding berseem or lucerne green fodder was found to be more profitable, as with feeding these fodders not only the milk yield was increased but it resulted in the reduction of cost also through substitution of concentrates with green fodders. Therefore, it was found desirable to divert some area for the production of such green fodders on the farm itself.

PROSPECTUS OF INCREASING INCOME AND EMPLOYMENT THROUGH DAIRYING ON SMALL FARMS

H. C. Bhatia and A. C. Gangwar†

An attempt is made in this paper to examine the prospects of increasing income and employment on small farms through dairying. The specific objectives of the study were (i) to estimate the existing and potential level of employment on small farms in Haryana and (ii) to locate the price of milk at which dairy would start paying in comparison to crops. Linear programming technique was used for developing the optimum farm plans. The results of the study indicated the existence of marginal scope for increasing the farm income by simply reorganizing the resources. Farm income can substantially be increased by adopting improved technology in the case of both crops and livestock. The increase in net returns was 50, 47 and 26.35 per cent on farms below one hectare, between one and 2.2 hectares with own tubewell and between one and 2.2 hectares having canal irrigation respectively at improved technology. The study further revealed that dairying provides additional employment for human labour on small farms with the additional availability of capital. The increase in the use of human labour was 35.14, 116.26 and 114.19 per cent at existing technology and 156.52, 153.29 and 170.18 per cent at improved technology on the above-mentioned three categories of farms respectively. The study also indicated that the price of milk should be increased from Rs. 1.50 to Rs. 1.65 for cross-bred cows, and from Rs. 1.75 to Rs. 2.15 per litre for buffaloes so as to enable the dairy enterprise to compete with crop technology.

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GENERATING FARM INCOME AND EMPLOYMENT THROUGH INTEGRATED CROP AND MILK PRODUCTION

Amrik S. Saini and Raj Vir Singh*

The National Commission on Agriculture has suggested that farm income and employment could be increased with the adoption of integrated crop and milk production. The present research investigation was planned to examine the scope of increasing income and employment with the adoption of crop and milk production on small farms in Punjab. Linear programming technique was used to develop the optimum and integrated crop and milk plans with the existing and improved level of farm technology. The optimization of resources under existing technology increased the income by 40 per cent which was further increased to 61 per cent with an increase in the number of milch buffaloes. The adoption of improved technology had a much higher impact on increasing farm income. Similarly, the integrated crop and milk production showed a scope for generating employment on small categories of farms. The optimum plans developed required that both short and medium-term credit should be made available to the farmers for harvesting the benefit of improved crop and milk production.

IMPACT OF MIXED FARMING ON ECONOMIC EFFICIENCY OF DIFFERENT FARM SIZES

Parkash Mehta, R. K. Sharma and J. N. Singh†

The objectives of the present inquiry were to measure the efficiency of cereal farming (situation A) and mixed farming, dairy plus cereals (situation B). It was assumed that the total economic (in)efficiency is composed of (a) system (in)efficiency, (b) risk (in)efficiency, and (c) individual (in)efficiency. These efficiency measures were adopted on small, medium and large farming situations obtained in the wheat-paddy-maize zone of the Punjab State during 1976-77. It was observed that system inefficiency was the highest under both situation A and B, but the degree of this was highest under the latter situation. Risk inefficiency and individual inefficiency were higher under situation A. Under situation A the medium farms were more efficient; but small farms increased their efficiency when they adopted mixed farming. When the overall effect of dairy was observed, it was found that the small farms were placed at a very enviable position. That is to say, the inclusion of dairy activity has improved their efficiency level to a very great extent. It was also found that under resource constraints and/or preference constraints, the small farms were better placed in terms of average net returns per animal. But when there was no restriction, that is, when it was assumed that the farmers were able to acquire whatever resources that were in short supply or were able to dispose off the surplus resources, the medium farms were found to be getting higher average net returns per animal.

APPROACH TO RURAL DEVELOPMENT THROUGH IMPROVED AGRICULTURE AND ANIMAL HUSBANDRY PRACTICES—SABARMATI ASHRAM GAUSHALA PROJECT

D. S. Thakur, S. P. Dhande and J. P. Singh‡

The Sabarmati Ashram Gaushala was founded by Mahatma Gandhi in 1926. The Gaushala owns some 1,200 acres of land donated to it in Ahmedabad and Kaira districts of Gujarat. Its management has been handed over to National Dairy Development Board on July 1, 1973, for proper development of agriculture and cattle farms. The project is aimed at enhancement of productivity of agriculture and cattle, production of high-yielding seeds and improved milch animals for distribution to farmers and other interested agencies, adoption of new agricultural technology, conducting research and development work and establishment of training and educational facilities in the fields of agriculture, animal husbandry and rural development. Accordingly, a number of activities have been initiated and intensified under the project. A mixed farming system, typical of farming pattern in India, has been adopted. The activities of the project include maintenance and development of agricultural farms, Jersey bull mother farms, centrally sponsored exotic cattle breeding farm, Kankrej herd, cross-bred herd, sperm station and training centre, bio-gas plants, mushroom production and seed processing plants. Initially, a lot of problems were faced as the agricultural farms of the Gaushala were seriously affected by soil salinity, high salt content of groundwater, high water table and waterlogging and

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therefore practically no successful crop production was possible. However, the mixed farming system involving integration of improved milch animals and crop production and the drainage plan recommended by the Central Soil Salinity Research Institute, Karnal and special cultural practices were adopted for reclamation of these farm areas and to develop them into fertile farms. This paper presents the results achieved during the past six years of work of this project. The analysis of the results showed that the crop-livestock complementarity and inter-relationship can be used for reclamation of problematic and infertile soil, increasing fertility of land, efficient utilization of farm by-products and roughages, development of ancillary activities and employment avenues. It is observed that total farm production over the last six years has increased by more than eight fold and per acre production, income, profitability and employment have increased by three fold over the same period. Every activity under the project has been economically viable and reached the break-even in the third year itself and has been self-sustaining thereafter. The savings from each activity are being used for further development of the project, manpower and other facilities, year after year.

ECONOMICS OF MIXED FARMING IN KULABA DISTRICT (MAHARASHTRA STATE)

J. M. Talathi and S. G. Borude*

The present study was conducted in Kulaba district of Maharashtra State with an object to investigate into and to compare the income and employment position on arable and mixed farms. Six villages were selected randomly from Mahad and Shrivardhan tahsils of Kulaba district on the basis of probability proportion. Twelve farmers from each village were selected randomly irrespective of their sizes of holdings. The selected farms were classified in two groups on the basis of total gross income from crop and livestock production. The farms having all 100 per cent income from crops were designated as 'Arable' farms and those having incomes both from crops and livestock in varying proportions were designated as 'Mixed' farms. The number of arable and mixed farms was 18 and 54 respectively. The data were collected by survey method for the agricultural year 1977-78.

The size of operational holdings on arable and mixed farms was 1.22 ha. and 1.31 ha. respectively. Though there was not much difference in the sizes of the two holdings, there were, however, glaring differences in cropping intensity, assets position, employment to family labour and income from farming on the two types of farms. The net cultivated area and gross cropped area were more on mixed farms by 28.33 per cent and 49.18 per cent respectively. The cropping intensity was higher by 16.51 per cent on mixed farms. The total farm assets of mixed farms were larger by 88 per cent. As compared to the arable farms, the mixed farms could provide 109.18 per cent more employment to male family labour, 83.45 per cent more employment to female family labour and 79.69 per cent more employment to child labour. Of the available family labour on the two farms, mixed farms could provide employment to 65.58 per cent of male labour, 91.85 per cent of female labour and 70.38 per cent of child labour as against 29.81 per cent, 58.44 per cent and only 34.07 per cent of the respective categories of work force on arable farms. The farm business income on mixed farms was greater by 89.71 per cent than on arable farms. This study distinctly showed that the mixed farms were superior to arable farms in respect of providing more gainful employment to family labour and also more income to the farm family.

PROSPECT OF DAIRY AND COMPARATIVE STUDY WITH CROP ENTERPRISE IN WEST BENGAL

A. K. Giri†

Dairy to become popular as a separate business proposition or as a component of mixed farming among the farmers should be governed by the following maximization rule $\frac{O_x - C_x}{C_x} > = < \frac{O_y - C_y}{C_y}$

where O_x and O_y are gross returns from dairy and crop enterprise respectively and C_x and C_y are money cost of dairy and crop enterprise. When only paid-out cost (C_p) is considered but not the

retained cost (C_r), then the maximization rule is $\frac{O_x - C_{px}}{C_{px}} > = < \frac{O_y - C_{py}}{C_{py}}$. A comparative study

of costs and returns from dairy and crop enterprise reveals that under West Bengal conditions dairy (cross-bred cow particularly) is much more profit rewarding than any crop or crop combinations except paddy either as mono-cropped or double cropped farming. The paddy and dairy with cross-bred cow seem to be a good combination under mixed farming. The rate of return from cross-bred cows is much more in the urban and semi-urban areas than in the rural areas, which suggests

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that raising of cross-bred cows can be popularised among the landless, small and marginal farmers provided the capital required for the purpose is arranged by institutional financing. Since the proportion of paid-out cost is much more than retained cost, the need for institutional financing is greater if dairy is to be popularised among farmers. Moreover, employment (in terms of man-hours) created by a dairy unit with two cross-bred cows in a year is much greater than that created by any mono-cropped or double cropped farm. Also the average gross return per man-hour is far greater in dairy in all locations.

IMPACT OF DIVERSIFICATION OF FARMING WITH DAIRYING ON INCOME AND EMPLOYMENT OPPORTUNITIES IN PUNJAB

Bant Singh and K. K. Jain*

This study was conducted to examine the impact of diversification of farming business by adopting dairy along with crop cultivation on the earnings and employment opportunities of different farm size holdings in Punjab in 1977-78. On the basis of soil-crop-climate complex Punjab State was divided into three homogeneous regions. Multi-stage random sampling was used for the selection of the sample. The cultivators in the selected villages in each region were classified into small, medium and large farm size-groups and in each size-group they were further divided into two categories, *i.e.*, category I, farmers pursuing only crop cultivation and making no sale of milk during the year and category II, farmers who have adopted dairying along with crop cultivation and were regular sellers of milk during the year. A comparable sample of five cultivators from each category and from each size-group in each region was selected at random, covering 90 cultivators. The study revealed that the average net income (returns over variable expenses) on small, medium and large holdings of category II was higher by 48.39, 38.45 and 40.28 per cent respectively as compared to that on the holdings of the respective size-groups of category I in the State. Similarly, annual employment of human labour on small, medium and large holdings of category II farms was higher by about 1,991, 2,924 and 3,041 man-hours or by 34 per cent, 31 per cent and 18 per cent respectively over that on the respective size-groups of holdings of category I. These results, therefore, show positive and significant effect of the diversification of farm business by adopting dairy along with crop cultivation on all farm size-groups in Punjab State.

DAIRYING IN ARID RAJASTHAN AS A SOURCE OF INCOME AND EMPLOYMENT

K. Anantha Ram†

Dairying has been considered as one of the most suitable enterprises for arid Rajasthan. Therefore, in order to assess the magnitude of returns and employment potential of milk production enterprise in the area, the data were collected from 79 randomly selected households distributed over four purposively selected villages in Jodhpur and Pali districts of arid Rajasthan. The scale of operation as determined by the production levels of milk in various farms has been taken as the basis to study the changes in costs, returns and employment. The analysis revealed that the average gross cost of production of milk for a cow and buffalo was Rs. 1.47 and Rs. 1.64 per litre respectively. The cost of feed and labour accounted for 64 and 24 per cent for cow milk and 70 and 18 per cent for buffalo milk. At all levels of milk production from cows, the returns over cost C (which includes labour cost) were negative except at above 5,000-litre level. The returns ranged from (—) 44 to (+) 5 per cent. In the case of buffalo milk the returns ranged from (—) 8 per cent to (+) 11 per cent at different levels of production. On the whole, the average returns were (—) 15 per cent for cow milk and (+) 2 per cent for buffalo milk.

The employment pattern revealed that on an average, a milch cow and buffalo generated 62 and 106 man-days per annum respectively and at all levels of production buffaloes generated more employment than cows. The operation of economies of scale in milk production with respect to labour cost was noticed. However, the low and even negative returns over cost C revealed that labour is not gainfully employed in milk production in this region.

FEMALE LABOUR AND LIVESTOCK REARING IN HIMACHAL PRADESH

M. S. Rathore and D. V. Singh‡

In Himachal Pradesh, the availability and participation of women in on-farm activities is greater than that of men mainly because of the forced emigration of young male workers. Hence, it is mainly the women folk who play a pivotal role in the socio-economic life of the hills.

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Considering felt costs and imputed costs together, livestock raising in the hills is less remunerative. But it provides regular employment to farm family members, particularly to females. The time devoted by family members to raising livestock is much more than that devoted to crop production and here too the contribution of females is relatively more than that of males. This is mainly because there are no employment opportunities available in other vocations and also there is nothing better to do at the farm. A special feature of the hills is that during the pre-winter months, labour utilization for crop production and livestock rearing is at the peak. Further, even during the most busy period, family members are not employed for more than 19 days, which clearly indicates that some of the labour can be permanently shifted from agriculture. Animal husbandry in the hills can be made profitable provided livestock development programme is launched in an integrated manner. The programme must include breeding and supply of animals suited to the local conditions, range management, pasture development, fodder production, etc. At present a good amount of the family labour time is used in tending of cattle which keeps the female members busy throughout the year. This is mainly because of lack of alternative employment opportunities. Therefore, emphasis should be given to the development of suitable rural works programmes in the hill areas. Also, appropriate labour intensive crop technology be developed, e.g., new HYVs, labour intensive cropping pattern, extension of irrigation, etc., so that the surplus labour can be gainfully utilized.

LABOUR ABSORPTION IN LIVESTOCK ECONOMY: A REGIONAL STUDY OF NORTH-WEST BIHAR

Harihar Bhakta*

Disguised unemployment in the agricultural economy is aggravated by the employment of workers and non-workers in the livestock economy. Labour absorption in this economy has been estimated here on the basis of primary data collected from all households of nine villages selected at random from North-West Bihar during July 1974 and June 1975. Labour absorption estimate on the basis of classes in the livestock economy shows that the intensity of disguised unemployment is much higher (a) on non-working days, (b) with manual working class and (c) with small size of animals. Besides, there is direct employment of human labour in utilizing bullocks for preparation of soil, lifting of water for irrigation purposes, drawing carts and threshing grains. On this basis, 53,400 man-days of employment have been estimated in the area. The main conclusions of the study are as follows: The agrarian economy, particularly livestock economy, is land-based and bullock dominated. The ratio of milch animals is very low. Disguised unemployment and labour absorption in livestock economy are more intensive, i.e., even higher than the agricultural economy. It is still higher with poor peasants and landless labourers. Resource capacity rather than labour supply determines the size of rearing animals. Buffalo rearing is still attached with caste occupation. Its ratio with classes doing manual labour is much higher. Direct open employment is still associated with bullocks. With the technological improvements and greater use of tractors, pumpsets, threshers, trucks, etc., its role is bound to decline. The policy implications emerging from this study are that the milch economy requires special attention for its extension. The resource capacity of poor peasants and landless labourers should be strengthened for extension of milch economy.

THE ROLE OF DAIRY ENTERPRISE IN OFFERING GAINFUL EMPLOYMENT TO WOMEN WORKERS IN RURAL AREAS OF AZAMGARH DISTRICT, EAST UTTAR PRADESH

Rajendra Singh and Radhey Sham†

The present study of 25 cultivating households of rural Azamgarh attempts to bring out the present level of dairy employment and to explore new vistas of gainful employment through this occupation to rural women workers of the district. On account of socio-economic conditions, poor health of livestock due to poor maintenance and feeding and lack of proper government policy, the dairy enterprise in our country is still in the same sorry state of affairs as it was centuries back. In the present study it has been found that the dairy enterprise accounted for only 30 per cent of the total women employment in the rural areas of the district. An average woman worker remained totally idle for almost half of the year. One more fact noted in this study is that social background has a bearing on dairy employment. Women in the lower strata were engaged more in dairy business than those in the higher groups. Lack of infra-structural facilities appeared to obstruct the marketing of milk and milk products. In view of all the factors as observed during the course of present study, it becomes an imperative that government may follow a conducive integrated policy for livestock development as well as improvement of dairy enterprise so that this may offer bright chances of gainful employment to women of the rural areas.

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ON RELATION OF FIXED AND WORKING CAPITALS WITH EGG PRODUCTION

T. B. Jain and U. G. Nadkarni*

The success of large scale poultry development programmes would depend, to a great extent, on ensuring profitable returns to the farmers engaged in commercial poultry keeping. Towards this end studies in the field of economics of poultry keeping would be of considerable practical value in providing pointers to directions in which economies in the methods of egg production and poultry rearing can be effected and their efficiency improved. The data collected from about 100 commercial poultry farms in Delhi and its surrounding villages for estimating the cost of poultry rearing and egg production were utilized to study the relationship of fixed and working capitals with egg production. Different functional forms were fitted to the data. The Cobb-Douglas function accounted for about 80 per cent of the variation. Using the Cobb-Douglas function isoquants were plotted and levels of capitals for constant production obtained. Optimum combinations of working and fixed capitals were determined for varying levels of egg production and for different rates of changes of the two capitals. The present study has given broad indications as to how the production is related to the two types of capitals.

ECONOMICS OF POULTRY ENTERPRISE IN JABALPUR

S. V. Karanjkar and S. N. Soni†

The paper outlines the findings of a study of poultry units in Jabalpur city, undertaken during 1978-79 mainly to determine the input-output relationships. The specific objectives of the study were (i) to study the relationship between costs and returns between different size-groups of poultry enterprise in Jabalpur and (ii) to study the influence of selected variables on costs and returns of poultry units. The study was undertaken in 1979 and covered a radius of about 5 km. around the city of Jabalpur. Out of a total number of 250 poultry units falling in this region, only 111 were found to have been functioning commercially while the rest maintained poultry either for home consumption or as a subsidiary occupation. Due to the limitation of time and other facilities at hand the sample size was restricted to 20 per cent of the population. The most significant observation was that the investment increased with the increase in the size of the enterprise. The relationship was reversed in the allocation of investment per bird. The investment in the higher size-group was only Rs. 20.78 per bird as against Rs. 33.20 for the lowest size-group. Feeding practices did not show great variation. Feeds constituted mainly of manufactured feed mixtures, purchased annually. The general practice was to feed on an average 50 to 100 gm. of feed mixture depending on the age of laying bird. The net profit per bird was highest in the large size-group and lowest in the smallest size-group. Labour earnings too increased in the same proportion, although the proportion of rise was more in the small units. Whenever and wherever it is possible the scale of business should be 1,000 birds and more in order to obtain the advantages of economic efficiency in terms of lower feeding cost to the extent of 10 per cent. It reduces labour cost by more than double per bird and 18 per cent lower cost on egg production.

ECONOMICS OF POULTRY FARMING IN KANPUR (CASE STUDY) (1979-80)

M. P. Azad, R. N. Yadav and H. K. Nigam‡

The paper attempts to work out the fixed and variable cost of the poultry farms, to study the costs and returns per poultry farm and per bird and to determine the economic analysis per bird and per 100 eggs on the poultry farms. Five poultry farms, namely, Best Food, Sengar poultry farm, Ajanta poultry farm, Kashmir poultry farm and Chandee-1 poultry farm were selected in Kanpur. The data were collected by survey method from the selected poultry farms by direct personal interviews with the help of records maintained on these farms. It is observed that the total variable and fixed cost per bird varied from farm to farm, being minimum Rs. 48.98 and Rs. 11.44 on the Sengar poultry farm and maximum being Rs. 51.75 and Rs. 11.97 on the Ajanta poultry farm with an overall average of Rs. 50.21 and Rs. 11.67 respectively. The average total and net maintenance cost per bird came to Rs. 81.88 and Rs. 65.33 respectively. The cost of production per 100 eggs also varied from farm to farm, the highest being Rs. 31 and the lowest being Rs. 28.90 with an

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overall average of Rs. 29.88. The net profit per farm and per bird varied from Rs. 27,577.59 and Rs. 10.79 on Ajanta poultry farm to Rs. 58,407.50 and Rs. 15.69 on the Sengar poultry farm respectively with an average of Rs. 41,781.56 per farm and Rs. 13.15 per bird. The economic analysis revealed that the net maintenance cost per 100 layers came to Rs. 6,533 whereas the monthly net cost of maintenance of a bird came to Rs. 5.48. The gross and net return per month and per bird came to Rs. 6.57 and Rs. 1.12 respectively on an average productivity of 18.25 eggs per month per bird. As such the monthly net return on a flock of 100 exotic birds came to Rs. 112.58. The poultry business appears to be running on low keys, because the enterprise is not reasonably remunerative in spite of heavy investment in the form of fixed as well as working capital. The percentage return to investment came to 9.03 which is much lower than in other livestock enterprise or even the bank rate of interest. In spite of low capital turnover in egg industry, poultry farming is not only a supplementary source of income but also provides a good alternative opportunity to employ the surplus labour remaining idle in the rural areas. The study concluded that the utilization of labour on a poultry farm having 100 birds came to about 820 labour days. Thus on a poultry farm of 100 layers about three labourers can get full-time employment.

AN ECONOMIC APPRAISAL OF SMALL HOLDER POULTRY ENTERPRISES AND THEIR EMPLOYMENT POTENTIAL

D. K. Das*

The present study examines the economics of poultry farming for broiler production by small holders and the employment potential it can generate. The data for the study were collected from small holder poultry producers of Morobe province and New Guinea Table Birds Pty. Ltd. which processes and markets the frozen chicken. Of a total of 133 small holder project owners, a sample of 124 was selected. The profitability of a representative enterprise was measured by the gross margin and net income received from its operations. The employment potential was worked out on the basis of projected demand for poultry meat and assuming that all demands would be met by the small holder poultry projects. The results of the analysis indicated that under certain assumed conditions, which are very close to the true situation, a producer would be earning a gross margin of PNG K181.76 (PNG K1.00 = US\$ 1.50) and a net profit of K66.80. This is equivalent to gross margin of K908.80 and a net profit of K334.00 in a year. The return per man-day of labour is estimated to be K5.68, which is more than double the minimum rural wage rate. The producers have been classified into convenient groups according to their gross margin. About 35.5 per cent of the growers earn a gross margin of more than K115 with a range from K118 to K212. They may be categorised as good producers as the gross margins cover interest, depreciation and wages of labour. About 34.7 per cent of the producers earn a gross margin between K62 and K115. This group covers a part of labour cost in addition to meeting the costs of interest and depreciation. The third group of growers consisting of 14.5 per cent earns a gross margin of less than K62. They are below marginal farmers as they are not even covering the costs of interest and/or depreciation. The last 15 per cent of farmers are not even covering the variable cost of production.

The past pattern of broiler meat demand was examined by fitting a linear equation of the form $y = a + bt$ to consumption data from 1973-74 through 1977-78, and anticipated potential demands for future years are worked out. The estimated employment potential shows that right now there is an opportunity of employing around 1,000 farmers in small holder broiler production. The projected annual increment in demand is expected to provide employment opportunities to 112 additional farmers every year. It is concluded that poultry farming is remunerative provided proper management practices are adhered to. It has the potential of creating employment opportunities in the farming sector and thus must be given a boost for expansion in agricultural plans.

IMPACT OF DAIRY DEVELOPMENT PROGRAMME ON LOW INCOME RURAL HOUSEHOLDS—A CASE STUDY IN ANDHRA PRADESH

S. Rami Reddy†

The impact of the dairy development programme implemented by the Small Farmers' Development Agency (SFDA) on its beneficiaries has been examined. The performance of the non-beneficiary households in dairying is compared with the beneficiaries. The study was conducted by the Technical Cell at the instance of the Government of Andhra Pradesh in the year 1978-79 in Visakhapatnam district of Andhra Pradesh. It was found that the socio-economic background of the sample households has no influence on the efficient management of the dairy. An examination of

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the structure and composition of assets of the beneficiary and non-beneficiary households indicated that the value of livestock forms a significant proportion of the total assets of the beneficiary households. Differences in the household incomes from the sale of livestock products are examined. It is found that the beneficiaries earned slightly higher incomes from the sale of livestock products than the non-beneficiaries. In order to examine the relative efficiency in the dairy management of the two groups, the average income per milch animal in each lactation has been examined. It is found that the non-beneficiary households earned higher average incomes per milch animal than the beneficiary households. These differences are mainly due to the improper selection of the beneficiary households, poor quality of milch cattle supplied and lack of real aptitude for the beneficiaries towards dairying. The average cost of maintenance did not vary very much between the two groups or among the small and marginal farmers and agricultural labourers within each group. A comparison of the estimated income per milch animal with the average income actually realised by the households showed that the income earned by the beneficiary households formed less than one-third of the income estimated by the SFDA. The main reasons for these differences are due to the lower milk yields, poor quality of milch animals supplied by the agency and improper dairy management techniques. Above all, the failure of the dairy development programme implemented by the SFDA is to be mainly attributed to the improper selection of the beneficiary households without examining their aptitude towards dairying. It was mainly the 'target-oriented' approach by the SFDA that led to the failure of the programme.

OPERATION FLOOD-I: FACTS AND FICTIONS

Dilip Shah*

The paper seeks to evaluate the performance of the Operation Flood-I in the light of the number of critical doubts raised against it. It also brings out important lessons to be considered for effective implementation of Operation Flood-II. The limitations of the paper were clearly stated. Within those limitations, an objective assessment of available facts leads to following important observations concerning its performance. The project had satisfactorily exceeded the target of number of producers and animals to be covered with expected number of Anand pattern dairy cooperatives. However, due to the advanced level of Gujarat as compared to other States, obviously a good proportion of the achievement is reflected in Gujarat, yet, the performance in the States like Tamil Nadu and Maharashtra is quite promising. One could reasonably expect the rapid extension of these institutions in the next phase of Operation Flood-II. Despite initial delays in the installation, processing and manufacturing of plants capacity had remained quite satisfactory. The expressed fear that the plants will be starving without milk leading to huge under-utilization of capacity has not come true because metropolitan dairies have shown an average level of 68 per cent capacity utilization. The objective of acquiring a dominating place in the urban milk market could be realised inasmuch as on an average 50 per cent of the market share is achieved by the metropolitan city dairies and as a result, organized dairies could be successful in holding the milk price. The project was heavily suspected on the ground of its potentiality of generating import dependence as it was regarded as one of the important intentions of donor countries. Facts have shown that the project has made the country free of imported milk powder and supported the indigenous milk powder manufacturing. As compared to its other achievements, the working of Operation Flood-I in regard to the production and distribution of technical inputs was not found to be very satisfactory. The production and consumption of milk in India during the Operation Flood-I had improved in the sense that while production was almost stagnant before 1970 and for about two decades the per capita availability of milk per day declined from 151 to 105 grams, it increased to 130 grams during 1970-80. The extended period of the project, delays in decision-making, change in the action plan, inadequate success in key targets, relatively higher rate of concentration of financial allocations and also achievements confined to an advanced State like Gujarat were the important constraints experienced during the project which could be considered to resolve for the more efficient and effective implementation of the Operation Flood-II.

ECONOMIC IMPACT OF DAIRY DEVELOPMENT PROGRAMMES IN THE MILK COLLECTION AREAS OF MADHAVARAM MILK SUPPLY SCHEME, CHINGLEPUT (TAMIL NADU)

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The present study was undertaken to examine the impact of Key Village Block (KVB) Scheme and Intensive Cattle Development Projects (ICDP) in the milk collection areas of the Madhavaram Milk Supply Scheme in Chingleput, Tamil Nadu. Response indicators such as animals maintained

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per household, average milk yield, feed fed to the animals and annual gross income of rural households were analysed on the basis of data collected from 18 villages. In the ICDP area the number of animals maintained per household was generally higher. The overall average daily milk yield per milch animal was highest in the villages covered under KVB programme followed by ICDP and control area. Dry feed given to animals in the ICDP areas was higher as compared to control villages and villages covered under KVB. It was observed that the annual gross income of the household was maximum in KVB villages followed by the households in the villages covered under ICDP and control villages respectively. However, these conclusions are based on limited data and a detailed study is required to judge the proper impact of these programmes.

IMPACT OF DAIRY PROJECTS ON RURAL ECONOMY—A CASE STUDY

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The object of this paper is to assess the impact of dairy development projects on rural economy from economic, technical, nutritional and social angles. This has been done by studying a sample of 98 beneficiaries and non-beneficiaries from a cluster of three villages in Akola district of Maharashtra. The investment in the enterprise either viewed per household or per animal is observed to be much low in the case of the non-beneficiaries than the beneficiaries, obviously because the former possessed mainly local animals. It is significant to note that particularly in respect of the landless labour, dairy has become their main means of livelihood (contributing 78.64 per cent of total income) in the case of the beneficiaries, while the non-beneficiaries from this group have still to count on labour mainly (62.13 per cent of total income) though their income also is supplemented to the extent of a little over one-third of total income by the milch animals. In the case of marginal farmers holding land upto one hectare also, dairy contributes a little over 50 per cent of their total income while the corresponding figure for the non-beneficiaries is practically at the same level as the landless labour. Considering the overall position, the contribution of income through dairy is more than two fold in the case of beneficiaries. Analysis of the return per rupee of investment reveals that the non-beneficiaries if they want to continue in the industry should go in for more investment. Positive returns in all the groups are observed in the case of the beneficiaries only.

In respect of buffaloes it is seen that the lactation period and total milk production obtained by the beneficiaries are higher by 27.64 and 33.85 per cent respectively. The higher expenditure on medicine is indicative of the fact that the beneficiaries have become conscious of the technique involved in the maintenance of breeds from outside area. The position in respect of cows is also the same. The percentage of milk consumption to total milk production is far too less in the case of the beneficiaries for all the size-groups. In spite of this, the per capita consumption compares very well with the non-beneficiaries, particularly that of the landless and the highest size-group. The beneficiaries feel elevated by keeping hybrid cows as they yield higher income which ultimately gives better social standing. It may thus be concluded that introduction of the dairy development programme has had a positive impact considered from all angles.

ECONOMIC IMPACT OF DAIRY DEVELOPMENT PROGRAMME ON RURAL ECONOMY—A CASE STUDY

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Break-even point and regression analysis were applied to find out the profitability of dairying and costs and returns per animal on different size of farms. The maintenance cost of the milch animal was worked out to be Rs. 883 out of which the cost of feeds and fodder was about Rs. 460. Labour accounted for one-fourth of the total cost of maintenance of a milch animal. The average cost of milk production per litre worked out to be Rs. 1.36. The average total milk output per milch animal was about 647 litres per lactation and the value of the same was about Rs. 1,295. The gross income was the highest with Rs. 1,763 per animal in the largest size-group. The maintenance cost of a milch animal has a positive correlation with the net returns from a milch animal in all the groups. The results showed that the correlation coefficient (r) was 0.3483 which was highly significant at one per cent level of probability. The regression coefficient was positive, that is, 0.6215, which indicated that the possibility still existed to increase the net income. The break-even output was worked out for different sizes of farms. The break-even output was less than the average output on all sizes of farms. In all such cases the total cost of production per litre was less than the minimum price fixed for one litre of milk and hence the farmers reaped profits. It is revealed from this study that each dairy animal provided employment on an average for about 73 days during the lactation period.

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