

**CONSOLIDATED REPORT OF THE ICAR AD-HOC SCHEME
CONTRIBUTION OF LIVESTOCK AND
CROP ENTERPRISES TO THE ECONOMY
OF TRIBAL FARMERS**

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SUMMARY

Livestock play a vital role in the Indian economy. Next to agriculture, animal husbandry is the most important economic activity in rural areas. These two together provide employment and income to the vast majority of the rural population. National Commission on Agriculture (1971) in its interim report has recommended that dairying is an important enterprise to supplement in case reduce under employment of landless agricultural labourers, marginal and small farmers. Keeping importance in view the project entitled "Contribution of Livestock and Crop Enterprises to the Economy of Tribal Farmers" was undertaken. The detailed objectives were as follows :

- (i) To study land structure, tenancy, cropping pattern, cropping intensity, production and productivity of different crops on different categories of tribal households/farmers.
- (ii) To study present status of different farming such as crop, livestock and farm forestry activities in terms of cost of cultivation, cost of production, gross income, net income on different categories of tribal households/farmers.
- (iii) To workout maintenance cost of cow, buffaloes and other animals, milk production and productivity of different breed of cow and buffaloes on different categories of farm holding.
- (iv) To examine input-output relationship in crop production and milk production of cow and buffaloes on different farm size.

(v) To study contribution of crop husbandry livestock husbandry and farm forestry in employment and income of farmers/households of different categories of land holding.

(vi) To study constraints for adoption of inbred animal husbandry practices in respect to breed, A.I, fodder production, feed financing, marketing etc. on different categories of households/ farmers.

Kanke block of Ranchi district, Bihar, was selected purposively for the present investigation. A list of tribal dominated villages Panchyats was prepared and from the prepared list, two Panchyats namely, Kamre and Kanke were selected randomly. Further a separate list of the villages of two selected Panchyats was prepared and among the villages, six villages namely Sundil, Konge, Kamta, Nawa Soso, Dhain Soso and Jaipur were selected randomly. From the selected villages, a separate list of various category of households/farmers i.e. landless households, marginal farmers, small farmers were prepared. The households were having no owned land for cultivation considered as landless households. The farmers were classified on the basis of land holding criteria as adopted by Govt. of Bihar. Four hundred tribal farmers consisted from landless households (23), marginal farmers (159), small farmers (158), medium farmers (38) and large farmers (22) were selected randomly for the study during 1996-97.

The study reveals that the average size of farm family was 8.53 which varied from 5.67 to 13.03 on different categories of farms. The size of farm family was positively related to size of agricultural holding. This was mainly because of prevailing joint family system on medium and large size agricultural holdings. The male, female and children constituted 28.60, 27.18 and 44.22 per cent in total number respectively, on the selected households/farmers.

The average size of agricultural holding was about 2.12 hectares which varied from 0.61 hectare to 4.26 hectares on the selected farmers. The proportion of irrigated and unirrigated area to net agricultural area were 4.24 per cent and 95.76 per cent. The area under irrigation was positively associated with the size of farm holding as large farmers developed more irrigational facility as compared to other categories of farmers. On an average about 10.17 per cent area of the farm was uncultivated land (waste land) which varied from 7.40 per cent to 13.67 per cent on the sample farmers.

It was further observed that the proportion of upland, medium and lowland were 51.00, 28.77 per cent and 19.81 per cent which varied from 41.80 to 57.73 per cent, 21.60 to 39.35 per cent and 14.75 to 20.67 per cent respectively, on the sample farmers. The proportion of upland and lowland to total cultivated land increased as size of holding increased while the reverse situation was observed in case of medium category of land on the sample farms.

The land tenancy analysis reveals that Saika (fixed produce) and Saiha (share produce) land tenancy systems were operating in the selected villages. The Saiha (share production) land tenancy was most dominating system in the selected villages. Under this system 50:50 ratio of main product and by product are distributed between land owner and tenant. The land owner does not share in expenditure involved in cultivation of crops.

The average number of fruit plant per household/farmer was 2.50 which varied from less than one to 4.86 on the sample households/farmers. The number of fruit plants was positively associated with the size of farm holding. The average number of timber plants per household/farmers was found to be 15.27 which varied from 7.25 to 25.02 plants on the sample household/farmers. The number of timber plants was further positively associated with size of agricultural holding. Among non timber plants bamboo was most important, the average number per household/farmers was about 33 which ranged between 35 to 53 on the sample farmers/households. The non-fruit plants were main source of income of the households from farm forestry activity. The average value of fruit and non-fruit plants per farm/household was tune of Rs.5288.18 and Rs.16,436.08 which varied from Rs.675.33 to Rs.9,803.95 and Rs.782.85 to 40,714.92 on the sample household.

The livestock activity reveals that the average number of draught animal per farm/household was 2.45 which ranged from 1.52 to 3.59 on the sample households. The bullock as draught. animal was dominating over He-buffaloes in the

agricultural operation on the sample farmers. In case of milch animal, the local cow was sole source of milk on the sample farmers/households. The existence of crossbred cow was almost nil. Similar situation was also observed in case of buffaloes. Out of four hundred sample households, only two farmers each from marginal and small farmers were rearing 3, crossbred cows while only one farmer, out of total sample households kept one buffalo as milch animal. The average number of local cow per household was about 1.35 which varied from 0.18 to 3.43 on the sample households. The number of milch cow increased with the size of holding increased.

The average number of goats per farm was observed to be 4.85 which ranged from 3.78 to 6.70 on the sample households. There was no trend observed in respect to number of goats and size of farm holding. The sheep rearing was not common in the sample villages. A few sample households/landless and large farmers were found to have sheep on their farms. The average number of sheep per farm was merely about 0.13 which varied from 0.10 to 0.61 on the sample households. The average number of pigs per farm was found to be 3.74. The number of pigs was maximum (4.62) on large size farm followed by landless households (4.52), marginal farmer (3.51), medium (3.21) and small (2.84) respectively. The average number of poultry bird was recorded to be about 6 per farm which varied from 5.05 to 7.40 on the sample households.

The investment in farm building and cattleshed per farm was tune of Rs.17,458.31 which varied from Rs.14,324.50 to Rs.25,958.60 respectively. The share of farm building and cattleshed in total investment was 94.0 per cent and 6.00 per cent respectively. The investment was positively associated with size of farm holding. The investment in farm machinery, farm equipment etc. per farm was observed to be Rs.6169.52 which ranged from Rs.538.24 to 15,661.85 showing investment in these items per farm decreased as size of farm holding decreased. Similarly investment on irrigational equipment per farm increased as the size of agricultural holding increased. The amount of investment was merely Rs.258.87 on marginal farm and as much as Rs.11,663.65 on large size farm.

The investment in livestock reveals that the value of draught animal per farm was observed to Rs.5818.98 which varied from Rs.3506.40 to Rs.9082.98. The investment was directly related to size of agricultural holding. The average value of milch animal per farm was round about Rs.2228 which varied from Rs.337 to Rs.5220. The average value of sheep, goats and pigs came to Rs.3028.10 per farm which moved from Rs. 4143.29 to Rs.3737.46 on the sample households. The share of sheep, goat and pigs was 6 per cent, 62 per cent and 32 per cent in total value respectively.

The cropping pattern and cropping analysis shows that the paddy was pre dominant crop which contributed to 69.62 per cent to total cropped area on the sample farms. The next important crop was ragi (marua) accounted for 8.16 per cent followed by gundli 4.28 percent, maize 3.33 per cent, arhar 3.33 per cent, urad and kulthi 1.90 per cent and 1.90 per cent respectively to total cropped area. The vegetable crops occupied 2.39 per cent to total cropped area on the farms. The cropping intensity was calculated to about 106.38 per cent which varied from 103.71 per cent to 110.31 per cent. There was no marked difference in cropping intensity on various categories of farm holdings.

The average yield per hectare of various crops reveals that per hectare yield of paddy (Imp.) was obtained to 22.32 quintals which varied from 20.00 quintal to 24.00 quintal on the sample farms. The average yield of local paddy (including Gora paddy) was recorded to be 16.57 quintals which varied from 15.44 to 17.50 quintals per hectare. The average yield of maize was found to be 37.32 quintals per hectare which ranged between 35.27 to 39.75 quintals on selected farmers. The productivity of marua was obtained to be 11.25 quintals per hectare which moved from 10.57 to 12.05 quintals. In case of gundli, the average yield per hectare was recorded to 9.08 quintals which varied from 8.56 to 9.61 quintals. The average yield of arhar, urad and kulthi was recorded to 11.75, 9.09 quintals and 8.04 quintals per hectare respectively.

The use of seed rate per hectare on the sample farmers experienced that the average quantity of seed per hectare of paddy(Imp.) was obtained 79.00 kg which varied from 75 to 85 kg. The average quantity of seed of local paddy (including Gora paddy) per hectare was observed to 107.29 kg which varied from 94.50 to 119.66 kg. On an average per hectare seed of maize crop was recorded to 27 kg which ranged from 25 to 28 kg. The average quantity of seed of marua and gundli was recorded to 11.51 kg and 10.0 kg per hectare. Similarly the average seed rate of arhar, urad and kulthi per hectare was recorded to 26.00 kg, 25.70 and 25.83 kg respectively on the sample farmers. The average seed rate of niger crop was further recorded to about 8 kg per hectare on the farms.

The use of chemical fertilizer on sample farmers experienced that urea and DAP were two important chemical fertilizers were used by the farmers in crop production. The average quantity of urea application in paddy cultivation (Improved variety) was recorded to 37.21 kg per hectare which varied from 31.62 to 45.53 kg. The application of chemical fertilizers in paddy cultivation was high on medium and large farms as compared to marginal and small farmers. The average quantity of urea per hectare of maize was recorded to 35.98 kg which varied from 28.37 to 41.25 kg on the sample farmers. The average level of urea application in cultivation of marua, arhar, urad and kulthi was recorded to be 3.61, 11.11, 13.61 kg and 10.27 kg per hectare respectively on the farms.

The input-output relationship in paddy (Improved) cultivation reveals that tribal farmers were using lower levels of farm inputs in cultivation of paddy on the farm. The regression coefficient of each of the input were less than unity on all categories of farmers showing diminishing marginal returns with respect to each input. The regression coefficients of bullock labour and human labour were appeared to be positive and significant. The regression coefficients of seed and manure and fertilizers were found to be positive but statistically they were not significant.

The regression analysis in case of local paddy cultivation further reveals that the inputs like seed, bullock labour and manure and fertilizer were obtained to be important variables which contributed to yield significantly. The regression coefficient of X_1 through X_4 were less than one in all fitted equation revealing diminishing marginal returns to scale. The regression coefficient of bullock labour and manure and fertilizer were positively and significant at one per cent level. The regression coefficient of seed further appeared to be positive and significant at ten per cent level.

The input-output analysis in maize cultivation indicated that regression coefficients of each of the input were less than unity on all categories of farmers showing diminishing marginal returns with respect to each of variable. The regression coefficients of human labour and

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seed were positive and significant at one per cent level and five per cent level respectively. The analysis also reveals that there is scope of increasing yield by use of manure and fertilizer as regression coefficient of this input seems to be positive and significant at ten per cent level.

The regression analysis in case of marua (ragi) cultivation further showed that regression coefficients of each of the inputs were less than one in all fitted equations showing diminishing marginal returns with respect to each inputs. The regression coefficient of human labour and bullock labour were found to be positive and were highly significant at one per cent level. The significant positive relationship between output and input (value of seed) was also obtained. The regression coefficient of manure and fertilizer appeared to be positive but it was statistically non-significant.

The cost of cultivation includes variable and fixed costs. The average cost of cultivation per hectare of paddy (improved variety) was obtained Rs.9348.00 which varied from Rs.9024.57 to Rs.9860.38. It was negatively associated with size of agricultural holding. The average cost of cultivation of local paddy (including Gora paddy) was calculated to Rs.8543.00 per hectare, which varied from Rs.8034.75 to Rs.9230.00. Again it was negatively associated with size of agricultural holding. This was mainly due to excess use of family labour in crop cultivation by marginal and small farmers. The average cost incurred in cultivation of maize

per hectare was recorded to be Rs.10,346.71 which ranged from Rs.9242.24 to 12,194.19. Like paddy cultivation, cost of cultivation per hectare decreased as size of holding increased. The reason may be due to excess use of family labour by marginal and small farmers. The cost of cultivation of ragi, gundli, arhar, urad and kulthi was recorded to be Rs.7817.99, Rs.7401.67, Rs.9756.42, Rs.9022.70 and Rs.7908.72 per hectare respectively on the sample farmers. In case of niger, costs were recorded to be Rs.7159.91 per hectare on the sample farms.

The average cost of production per quintal of Improved paddy and local paddy was tune of Rs.411.18 and Rs.497.23, on the sample farmers. The cost of production was high on marginal and small farmers as compared to medium and large farms. The average cost of production per quintal of maize was recorded to be Rs.273.43 which varied from Rs.252.17 to Rs.299.91. The average cost of production of marua and gundli was obtained Rs.681.29 and Rs.805.00 per quintal. In case of pulse crops such as arhar, urad and kulthi, the cost of production was observed to be Rs.792.38, Rs.989.62 and Rs.892.27 per quintal respectively. Per quintal cost of production for niger was recorded to Rs.1051.09 which varied from Rs.905.91 to 1131.02 on the sample farmers.

The gross return per hectare of paddy (Improved), paddy (local), maize, marua, gundli was recorded to be Rs.9693.31, Rs.6916.69, Rs. 15,956.50, Rs.4891.68 and Rs.4259.57 respectively on the sample farmers. In case of pulse crops, the gross return per hectare of arhar, urad and kulthi was

amounted to Rs.14572.48, Rs.10303.12 and Rs.8908.77 respectively. The average gross return from niger was tune of Rs.5086.26 per hectare. The average net return per hectare was positive in case of paddy (Improved) maize, arhar, urad and kulthi crops showing Rs.377.23, Rs.6381.63 Rs.4816.05, Rs.1218.37 and Rs.1037.27 on the sample farmers respectively. The crops like paddy (Local), marua, gundli, niger could not generate sufficient amount to meet total cost incurred in production of these crops by the farmers.

The average quantity of cereal produce was recorded to be 35.07 quintals per farm. Among cereals, paddy was most important followed by maize, marua and gundli respectively. The average quantity of pulse produce and oilseed produce was obtained 1.73 and 0.93 quintals per farm. Among vegetable crops, potato was most important vegetable on the farms. The vegetable was not taken as commercial crop by the sample farmers. The average quantity of vegetable production per farm was recorded to 8.34 quintals. The average gross income from crop production including vegetable crops was observed to Rs.20,255.70 per annum per farm. The share of food crops and vegetable crops in gross annual income was accounted for 83.72 per cent and 16.28 per cent respectively. The gross value of farm produce was directly related to size of agricultural holding.

The average annual employment of human labour in crop enterprise was recorded to be 348.43 mandays per farm. The contribution of female (owned family labour) was high (54 per cent) than that of male (own family labour) in crop

production on the sample farmers. The employment of bullock labour per farm was recorded to 74.25 days. The total employment days of human and bullock labour was positively associated with size of agricultural holding.

The average milk yield of lactating local cow was found to be 1.46 kilograms per day. There was no marked difference in milk yield per day on different categories of households. Season-wise average milk was obtained to 1.74 kg, 1.46 kg and 1.21 kg in rainy, winter and summer seasons per day.

The average net maintenance cost per day of lactating local cow was amounted to Rs.12.30. The net maintenance cost was high on medium and large farmers than that of other farmers. The human labour was most important item of expenditure among variable costs, which accounted for 36.12 per cent followed by fodder 28.66 per cent, concentrate 18.80 and green fodder 14.41 per cent respectively.

The cost of milk production per kilogram reveals that average cost of milk production per kilogram was high on large farm and minimum on landless households. The average cost of milk production per kilogram was calculated to Rs.7.06, Rs.8.27, Rs.8.47, Rs.8.50 and Rs.8.56 on landless, marginal, small, medium and large farmers, respectively. The average quantity of milk production per cow per year was obtained to 375.84 kilograms. The variation in milk production of cow during year on the sample farmers was mainly due to variation in lactation days of cow. The average annual gross income from milch cow per year was recorded to Rs.3947.17.

Result of regression analysis indicates that regression coefficient of green fodder was positive and significant at one per cent level. Further the regression coefficient of human labour was positive and statistically significant. The regression coefficient of dry fodder was negative and significant in case of marginal, small and medium farmers suggesting reduction in use of this input by these farmers. The analysis further reveals that regression coefficient of concentrate was positive in case of marginal and small farmers while it appeared to be negative in case of resource base farmers i.e. medium and large farmers, but in all cases regression coefficient were not significant.

The analysis further reveals that average annual income from livestock activities was amounted to Rs.3883.74 per farm/household. Among livestock activities, milch cow contributed about 53.18 per cent to gross annual income. The next important was goats and pigs constituted about 31 per cent and 16.00 per cent in total livestock's income. It was found that goats and pigs were primary source of landless household and marginal farmers from livestock activities. For small, medium and large categories of farmers, milch cow played an important role followed by goat and pigs in gross income from livestock activities. On an average farmers received an annual income Rs.343.16 from poultry bird. The landless household received maximum income from poultry bird as compared to other categories of farmers.

It was observed from the analysis that livestock activities created an annual employment opportunity as 538.72 mandays which varied from 414.55 days to 725.21 mandays. Among livestock, draught animal created an average per year 168 mandays, goats and sheep 145 mandays, milch animal 137 mandays and pigs 126 mandays respectively on the sample farms. The total employment opportunities in livestock activity was influenced by number of Livestock and type of livestock kept by the farmer.

The analysis further indicates that livestock and crop enterprises were the main source of employment of the farmers. The average annual employment per farm was observed to be 987.18 mandays which varied from 414.55 to 1347.52 mandays. The number of employment days was positively associated with size of agricultural holding. The livestock enterprise was the most important farm activity for providing employment on the farms/households. The livestock and crop enterprises constituted 64 per cent and 36 per cent respectively to total employment on the farm. The share of livestock activity declined as the size of farm holding increased. It was also observed that livestock activity was sole activity for providing employment of landless households, marginal and small farmers.

The income analysis shows that crop, livestock and farm forestry enterprises were prime source of on farm income of the farmers. The average annual gross income from these enterprises was found to be Rs.26,413.81 per farm. The contribution of crop husbandry, livestock and farm forestry

was 76 per cent, 14.70 per cent and 7.30 per cent respectively. The livestock was main source of farm income of landless households while crop husbandry was important source of on farm income of marginal, small, medium and large farmers.

The tribal farmers were fully acquainted with improved crossbred programme of cow but the main constraints in adoption of this programme on the households/farmers were lack of capital, higher maintenance cost, lack of veterinary facilities, high price of crossbred cow, non-availability of crossbred in local market, non-availability of green fodder, non-suitability of male calves of crossbred in farming operation etc. Similarly it was also found that more than seventy per cent of farmers were fully acquainted with improved bred of pigs. However, the adoption level was very poor mainly due to non-availability of piglets in the area, lack of capital, high price of piglets and lack of marketing facility for sale of produce.