Research Article

DAIRYING AS SUSTAINABLE LIVELIHOOD ENTERPRISE FOR WEAKER SECTIONS

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ABSTRACT

Action research was conducted in the Elangiyanur and Samireddipalli villages of Cuddalore and Vellore districts of Tamil Nadu, having highest weaker section and high dairy animal population. Dairying is the livelihood for majority of the farmers in the study area. A total of 100 farmers with dairy animals were selected through participatory approach involving rural local government system. Interventions were carried out in the feeding domain by introduction of proven scientific dairy farming practices and providing inputs such as concentrate feed for 100 days feeding contract, leguminous fodder seed (Hedge Lucerne), mineral mixture, TANUVAS GRAND. Usage of unconventional feed resources (brewery waste and azolla) and preparation of own concentrate feed were also promoted. Economic impact noticed were increase in quantity of milk production by 0.863 and 0.901 liters; increase in quality of milk i.e. fat content by 1.08% and 1.07% and SNF by 1.24% and 1.15%; cultivating green fodder had increased by 24% and 16%; azolla cultivation adopted by 46% and 58% ; conception rate improved by 70.2% and 71%; inter calving period reduced 43% and 47%; average feed cost /day/ animal / litre of milk was reduced from Rs.25.51/- to Rs.13.41/- and Rs.14.75/- to Rs.8.52/- of the beneficiaries in Cuddalore and Vellore district respectively. By adoption of scientific dairy farming technologies, a beneficiary is able to get an additional monthly income of Rs.2070/- in Cuddalore district and Rs.2490/- in Vellore district. Scientific interventions ensured social and financial securities to make dairy farming a sustainable livelihood option.

INTRODUCTION

India, world's largest milk producer and has the world's largest dairy population. Livestock sector contribute over one-fourth to the agricultural gross domestic product and engage about 9% of the agricultural labour force (Report of working group, 2012-17). Livestock is the vital source of income for more than one-fifth (23%) of agricultural households with less than 0.01 hectare of land; and among land distributed for livestock, half of the land allotted for dairy farming (NSSO, 2014). Dairying has provided livelihoods to millions of the poorest in India and for many it is the sole source of livelihood bringing cash into their hands, twice a day throughout the year (Jaiswal *et al*., 2018). Dairy enterprise is considered a "treasure" of the Indian economy, particularly for rural systems. It provides nutrition, draft animal power, organic manure, supplementary employment, cash income, and a 'cushion' for 'drought proofing' in India (Patel, 1993; Paroda, 1998). The sector involves millions of resource-poor farmers, for whom animal ownership ensures critical livelihood, sustainable farming, and economic stability. Also, in Tamil Nadu dairy farming plays a pivotal role in improving the socio-economic status of the rural poor.

In Vellore and Cuddalore districts, dairying is the most sought income generating activity by the rural weaker sections next to agricultural labour. Majority of the rural weaker sections maintain two or three dairy animals. Income from sale of milk helps the households to meet out their day to day financial needs and also acts as buffer during non agricultural seasons, since most of them are agricultural labourers. However productivity of the dairy animals is low resulting in less income. Though the productivity of animals depends on their genetic potential, it is always prudent to feed them with optimum quantities (balanced feeding) to exploit the maximum production potential of the animal. But most of the rural weaker sections are not aware of scientific dairy farming

technologies for maximizing the production due to poor linkage with livestock extension functionaries.

Smallholder dairying, inspite of being a fore runner in milk production and in generating self employment for rural weaker sections, it has various limitations. The constraints faced in small holder dairying were regularly reported by various field level researchers. The constraints faced by the farmers have to be addressed in a suitable way to increase the productivity of the dairy animals and also to improve the socio-economic status of the farmers. Research and extension outputs in our country provided a basketful of technological, institutional and policy level innovations which help the farmers to overcome the constraints. Majority of the weaker sections operate under resource-poor conditions with few purchased inputs and limited technologies. The dairy production technologies are developing very fast, but the ability of dairy farmers to accept the new innovation does not seems to be keeping pace with it. Feeding is the major factor determining not only the production performance of dairy animals but also the profit margin of dairy enterprise. Out of the total production cost, 70% is being spent for feeding. The rural weaker sections in the project area do not follow any rationale in feeding their dairy animals. With this setting the following objectives was taken in the present study to assess the transformative change in the socio-economic status of dairy farmers.

MATERIALS AND METHODS

Cuddalore and Vellore districts were purposively selected. From these districts, Elangiyanur and Samireddipalli village panchayats with highest weaker section and dairy animal population were selected as the study area. From each selected village panchayats, 50 livestock farmers were randomly selected to constitute a sample size of 100 livestock farmers.

The officials of *Puthu Vazhvu Thittam*, a World bank programme and Panchayat Raj Institutions, were used for community mobilization. Accordingly two groups per village was formed with 25 members in each group. Farmers, farm women, local bodies were utilized to identify the technologies through focus group discussion, participatory rural appraisal, discussion with the various stake holders and survey. The technologies identified for training are 100 days feeding contract with pregnant cow i.e. 30 days pre partum and 70 days post partum, use of TANUVAS – GRAND and TANUVAS - mineral mixture, cultivation of Hedge Lucerne in farmer fields and feeding it to dairy animals as a protein supplementation, azolla cultivation, inclusion of locally available unconventional feed in the ration of dairy animals, Low cost concentrate feed formulation with locally available feed ingredients for dairy animals and clean milk production practices.

Action research was adopted in this study. Capacity building on scientific dairy farming practices was imparted to all the beneficiaries. Interventions were carried out in the feeding domain by introduction of proven scientific dairy farming practices and providing inputs such as concentrate feed for 100 days feeding contract, leguminous fodder seed (Hedge Lucerne), mineral mixture, TANUVAS GRAND. Usage of unconventional feed resources (brewery waste and azolla) and preparation of low cost concentrate feed were also promoted.

Beneficiaries were monitored for the usage of inputs supplied; production and productivity of animals were recorded. Enhancement of economic benefits, reproductive performance of dairy animals was audited regularly. Cost of feed per litre of milk production, enhancement in azolla cultivation area, enhancement of fodder production area, improvement in reproductive performance of animals were calculated.

The customized excel based software designed by the Department of Animal Nutrition, Veterinary College and Research Institute, Namakkal was used for the calculation of Dry Matter Intake (DMI), Crude Protein (CP) and Total Digestible Nutrient (TDN) available to each animal. Based on the feed (concentrate, straw, green fodder etc.) given to each animal the nutrient availability was calculated and advised the farmers accordingly.

Table 1. Evaluation of nutrients fed to animals by using customized software

Category	Cuddalore		Vellore	
	Deficient (%)	Excess (%)	Deficient (%)	Excess (%)
DMI kg	8	92	26	74
CP kg	24	76	20	80
TDN g	12	88	30	70

It could be concluded that majority of the animals were fed with excess energy and crude protein than the requirements whereas minerals were deficient. Cuddalore district is deficit in Calcium, Phosphorus, Copper and Cobalt; and Vellore district is deficit in Calcium, Phosphorus, Copper, Cobalt and Zinc.

RESULTS AND DISCUSSION

It is evident from Table 2 that the milk yield of animals had increased by 0.87 litres per day in Cuddalore district and 0.9 litres per day in Vellore district by adopting balanced feeding strategies.

The fat content of milk had increased by 1.08% and 1.07% and SNF by 1.24% and 1.16% in Cuddalore and Vellore district respectively (Table 3). The improvement is due to balancing of nutrients (energy, protein, fibre and macro nutrients) which might have improved microbial protein synthesis and also due to supply of essential minerals.

Table 2. Milk yield of animals before and after intervention

SL. No.	District	Milk Yield/ day/ cow (in litres)		Increased milk yield/ day/ cow	Sale Price/ litre (in Rs.)	Increased income/ day/ cow (in Rs)
		Before	After			
1	Cuddalore	3.21	4.07	0.86	22.22	19.21
2	Vellore	9.0	9.90	0.90	24.16	21.79

Table 3. Fat and SNF content of milk before and after intervention

SL. No.	District	Fat %			SNF %		
		Before	After	Increase	Before	After	Increase
1	Cuddalore	3.99	5.06	1.08	7.79	9.03	1.24
2	Vellore	3.23	4.30	1.07	8.03	9.19	1.16

Area under fodder cultivation

Figure 1 In Cuddalore district, majority of the animals are indigenous breed and more grazing land is also available in the study area. Hence the dairy animals are maintained with grazing, agricultural by products and commercial concentrate feed. This might be the reason for cultivating less green fodder in Cuddalore district.

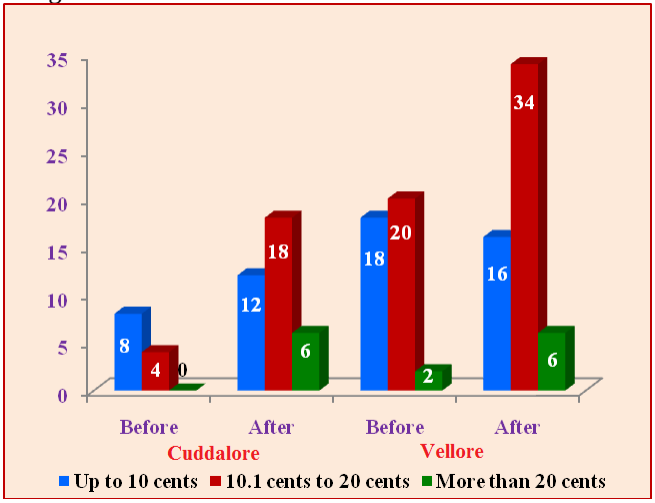

Fig. 1. Area under fodder cultivation

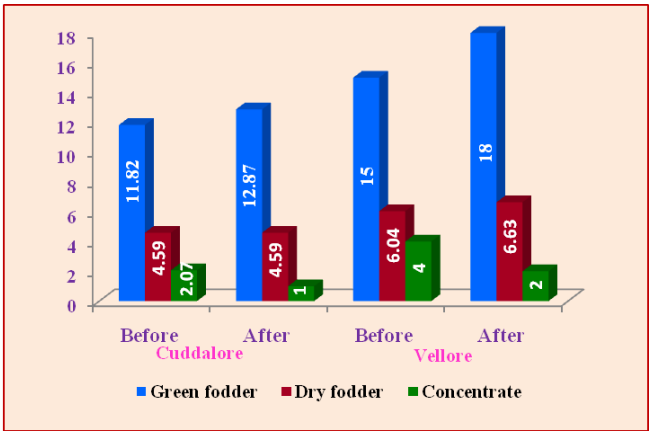

Fig. 2. Average feed fed per animal

After intervention, the beneficiaries understood the importance of feeding leguminous fodder as protein source and they started cultivating it. A reasonable proportion of beneficiaries started cultivating green fodder (24% increase in Cuddalore district and 16% increase in Vellore district) and also had increased the area under fodder cultivation. But it is in a slow and gradual manner based on the irrigation facilities and available water sources.

Average feed fed per animal

In both districts the beneficiaries decreased the quantity of concentrate feed by replacing with green fodder after technical intervention of balanced feeding (Fig. 2).

Adoption of SMART mineral mixture and GRAND (Gruel Routed Additive Nourishment Drops)

Before intervention, only 10% of the beneficiaries in Cuddalore district and 16% of the beneficiaries in Vellore district adopted the practice of mineral mixture supplementation to dairy animals. The distribution of SMART mineral mixture and GRAND supplement as input for period of one year has helped them in adopting the practices. Effect of mineral mixture and GRAND supplement in terms of increased quantity and quality of milk had motivated all the beneficiaries to continue the practice.

Table 4. Adoption SMART mineral mixture and GRAND

Supplement	Cuddalore		Vellore	
	Before (%)	After (%)	Before (%)	After (%)
SMART mineral mixture	10	100	16	100
TANUVAS GRAND	0	100	0	100

Conception rate

From Figure 3 it could be observed that number of artificial inseminations per conception had decreased from 3 -4 to 1-2, so the conception rate was improved by 70.2% in

Cuddalore district and 71% in Vellore district due to balanced feeding and supplementation of minerals.

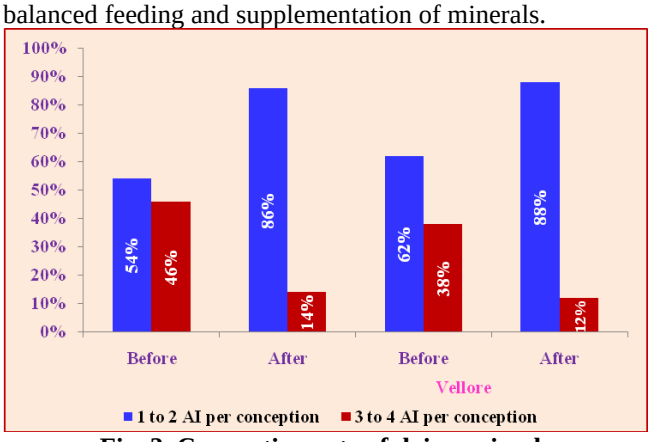

Fig. 3. Conception rate of dairy animals

Calving interval

The reduction in inter calving period was 43% in Cuddalore district and 47% in Vellore district among those dairy animals which had high inter calving period of more than 15 months. This might be due to improved conception rate (Fig. 4).

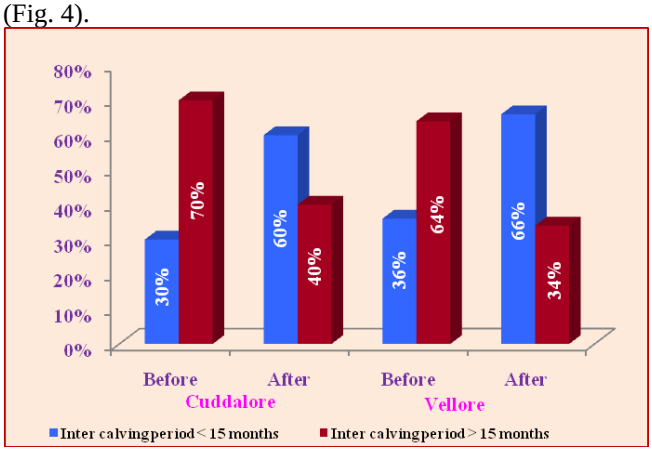

Fig. 4. Calving interval of dairy animals

Adoption of azolla

Model azolla units both in silpaulin sheets and cement rings were established. The cost of production is Rs.0.70/kg by using silpaulin sheet and Rs.1/kg by using cement rings. In Cuddalore district 46% of the beneficiaries and in Vellore district 58% of the beneficiaries had adopted azolla cultivation. In the project areas, the beneficiaries were feeding ½ to 1 kg of azolla for dairy animals and thereby they were able to replace ½ kg of concentrate feed. Further, they were advised to increase the quantity of feeding azolla to reduce the feed cost. The beneficiaries are still in adoption stage by seeing the benefits attained by others.

Table 5. Adoption of azolla

Category	Cuddalore		Vellore	
	Before (%)	After (%)	Before (%)	After (%)
Adopted	0.00	46.00	0.00	58.00
Non-adopted	100.00	54.00	100.00	42.00

Less growth was reported during summer and they were advised about the methods to reduce the summer heat to maximize the growth of azolla.

Low cost concentrate feed preparation

Farmers depend mainly on commercially available concentrates to meet the concentrate requirement of the dairy animals, which reduces the profit margin. To elude this, feed formulation with appropriate combination of locally available cost-effective feed ingredients that supplies all the nutrients needed for the dairy animal was developed. The locally available feed resources in the study area are rice bran, paddy straw, sorghum (green & dry fodder), groundnut straw and sugarcane tops. Unconventional feed such as black gram husk, green gram husk, horse gram husk, tapioca flour / waste and brewery waste. Hence, usage of these feed resources were encouraged to reduce the feed cost.

Table 6. Low cost concentrate feed formulated for Cuddalore district

SL. No.	Name of the ingredient	Inclusion level (%)	Amount
1	Maize @ Rs.13/kg	20.0	260.00
2	DORB (maximum 10% husk) @ Rs. 13.50 /kg	40.0	540.00
3	Legume dust/ waste @Rs. 15/kg	33.0	495.00
4	Calcite @Rs.4.50 /kg	4.0	18.00
5	Mineral mixture @ Rs.55/kg	1.0	55.00
6	Salt @ Rs.10/kg	2.0	20.00
Cost /100 kg			**1388.00**

Cost per kg of concentrate – Rs. 14/kg (including feed grinding charge)

Cost of milk production

The average feed cost/day/animal/litre of milk reduced from Rs.25.51 to Rs.13.41 in Cuddalore district and from Rs.14.75 to Rs.8.52 in Vellore district due to interventions like balanced feeding, azolla feeding, supplementation of mineral mixture, use of GRAND supplement and low cost

feed preparation (Table 8). Optimization of feeding through replacing the high cost commercial concentrate with low cost concentrate feed using locally available feed ingredients.

Table 7. Low cost concentrate feed formulated for Vellore district

S. No.	Name of the ingredient	Inclusion level (%)	Amount
1	Maize/Rice @ Rs.13/kg (Rice maximum 15%)	30.0	390.00
2	Rice bran/Karuka bran @ Rs. 13.50/kg	39.0	526.50
3	Dry brewery waste @Rs.7 /kg (to get 24 kgs of dry brewery waste 34.3 kgs of wet brewery waste required)	24.0	240.00
4	Calcite @Rs.4.50 /kg	4.5	20.25
5	Mineral mixture@ Rs.55/kg	1.0	55.00
6	Salt @ Rs.10/kg	1.5	15.00
Cost /100 kg			**1246.75**

Cost per kg of concentrate – Rs. 13/kg (including feed grinding charge)

Table 8. Feed cost per litre of milk

S. No	Feed	Cuddalore		Vellore	
		Before (in Rs.)	After (in Rs.)	Before (in Rs.)	After (in Rs.)
1	Green fodder	3.54	3.86	4.5	5.4
2	Dry fodder	36.72	36.72	48.32	53.04
3	Concentrate	41.40	14	60.0	26.0
Feed cost/litre of milk		**81.66/3.2 = 25.51**	**54.58/4.07 = 13.41**	**132.82/9 =14.75**	**84.44/9.9 = 8.52**

Table 9. Dung consistency of dairy animals

SL. No.	SARA symptoms	Cuddalore		Vellore	
		Before (%)	After (%)	Before (%)	After (%)
1	Semi-solid dung consistency & presence of concentric ridges on hooves	42	12	56	16
2	Solid dung consistency	58	88	44	84

By adoption of scientific feeding technologies, a beneficiary is able to get an additional income of Rs.1500/- month in Cuddalore district and Rs.1830/- month in Vellore district.

Incidence of Sub Acute Ruminal Acidosis

Estimation of dung consistency

The dung consistency of the selected dairy animals was estimated before and after intervention to find out the sub-acute ruminal acidosis problem due to feeding of gruel / kitchen waste.

Among the dairy animals which had problem in the dung consistency 71.4% in Cuddalore district and 71.9% in Vellore district got rectified due to TANUVAS GRAND supplementation.

Use of brewery waste

All the beneficiaries in Vellore district were feeding brewery waste without considering the milk production potential of the dairy animals. After technical intervention on balanced feeding, a remarkable proportion (58%) had decreased the quantity of brewery waste fed to the animals resulted in reduction of production cost.

Increased milk production, decreased feed cost and improved health status by adoption of scientific dairy farming technologies paved way to get an additional monthly income of Rs.2070/- in Cuddalore district and Rs.2490/- in Vellore district.

Entrepreneurial unit on low cost concentrate feed preparation

Young educated unemployed beneficiaries were motivated to start up low cost concentrate feed preparation unit. The concentrate feed preparation unit with the grinding capacity of 50 kgs per hour with 2 HP motor (1.5 units per hour). It provides an additional income of Rs.21000/- and Rs.48000/- in Cuddalore and Vellore district. In addition to this, the entrepreneurial unit provides an additional employment of 19 man days per month in Cuddalore district and 30 man days per month in Vellore district.

Table 9. Income generation from entrepreneurial unit

Particulars	Cuddalore	Vellore
Cost of ingredients	Rs. 1388.00 (for 100 kgs)	Rs. 1246.75 (for 100 kgs)
Electricity tariff	Rs. 4/unit	Rs. 4/unit
Power consumption	1.5 units per hour	1.5 units per hour
Grinding capacity	50 kgs / hr	50 kgs / hr
Cost of per kg feed	Rs. 1388 + Rs.12 = 1400 /100 = Rs. 14/kg	Rs.1247 + Rs.12 = 1259/100 = Rs. 12.60 /kg = Rs.13
Sale price	Rs. 17/kg	Rs. 17/kg
Profit	Rs.3 /kg	Rs. 4/kg
Additional income	Rs.21000/month	Rs. 48000/month
Additional man days of employment generated	19 days	30 days

Before intervention, beneficiaries purchased concentrate feed from nearby towns. The beneficiaries are now able to save Rs.3 to 8/ kg of concentrate feed by purchasing low cost concentrate feed prepared in the village and also the travelling time is reduced.

CONCLUSION

The scientific technologies disseminated had considerable rate of adoption among the beneficiaries, since the advantages of the technologies were experienced through participatory learning approach and had impact on productivity and cost of production. Thus these technologies had become a regular practice of the rural weaker sections by ensuring financial security, food security, direct and indirect avenues which in turn sustain the dairy farming as livelihood enterprise.

REFERENCES

Jaiswal, P., H. Chandravanshi, and A. Netam. 2018. Contribution of dairy farming in employment and household nutrition in India. *International Journal of Avian & Wildlife Biology*. **3**(1): 78–79.

National Sample Survey Office. 2014. Key indicators of land and livestock holdings in India. Ministry of Statistics & Programme Implementation, Government of India.

Paroda, R.S. 1998. Indian dairy industry in the emerging scenario. Keynote address delivered at XXIX Dairy Industry Conference, 28th November, 1998. Karnal: Indian Dairy Association (North Zone).

Patel, R.K. 1993. Present status and promise of dairying in India. Indian Dairyman, **45**(7) (July): 276-308.

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