

Integrating production with processing and converting waste into wealth

A success story in dairying from Andhra Pradesh

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Being an entrepreneur is a tough choice, which takes lots of courage and hurdles, and moreover if it is related to agriculture than it takes much more patience and guts than one can think of. A story will introduce farmer turned integrated dairy entrepreneur and now an established businessman who proved that nothing can beat your success until and unless you have a strong will power to reach your aim destination. The paper show that Shri Ch. V.K. Narasimha Rao from Kulla Mullavaram Village, East Godavari of Andhra Pradesh, successfully brought unorganised dairy neighbouring under a brand 'Madhura' and integrated production with processing and converting waste into wealth.

Keywords: Dairy, Integrated dairy farm, Waste into wealth

Introduction

It was 20 years ago when Shree Ch. V.K. Narasimha Rao hailing from an farming family of Kulla Mallavaram village, was putting pen to paper to register his dairy company M/s Chitturi Agro Lactating Foods Pvt. Ltd. and just had one goal, tap into East Godavari district of Andhra Pradesh's unorganized dairy sector in order to bring it under a brand-Madhura.

He recalled that only 1/5th of the organized dairy sector was covered by existing suppliers. The other 80 % had great potential and was waiting to be tapped. He commenced his commercial venture mainly with Murrah buffaloes purchased from northern part of India and HF cows purchased from southern India (in and around Bengaluru). He had undergone a formal training on commercial dairy farming practices from Technology Business Incubator unit of ICAR-National Dairy Research Institute, Karnal, Haryana

with an aim to make his dairy start-up sustainable and profitable. Presently in his registered integrated dairy farm, he owns a total dairy animal strength of 375 which includes 70 cows and 85 buffaloes in milk. Apart from his own daily production of 1,500 litres, he is also procuring about 2,000 litre of milk on daily basis from farmers. Moreover, the integrated dairy model is also equipped with a milk processing plant of capacity 3,500 litre/day that must maintain the management and business standards. It is important to check that the milk meets the standards of temperature, flavour, total acidity, tanker cleanliness, odor and the deficiency of antibiotics when it arrives at milk processing plants. The butterfat and solids-not-fat substance of this raw milk is also evaluated. The quantities of butterfat substance, solids-not-fat substance and amount are used to find out the quantity of money paid the dairy farmer. All raw milk should

be processed within 72 hours of release at the milk production plant. The milk is pasteurized that kills all pathogenic germs that may be present in milk. Keeping the milk refrigerated is a great method to slow the development of these germs.

Besides production in his own dairy, he procures milk from nearby farmers by paying ₹ 25 and ₹ 34 for each litre milk of cow and buffalo, respectively. The main products processed on regular basis are pasteurised milk, curd, and butter milk and sold at ₹ 42, 40 and 20 per litre, respectively. Furthermore, the unit also processes products like full cream milk, ghee, paneer and khoa on demand or order basis. The products are sold in their own retail outlets under the brand name Madhura.

The integrated dairy model is based on sound environmental and efficient sustainable practices and has encouraged good business sense and promised future success (Fig. 1). This

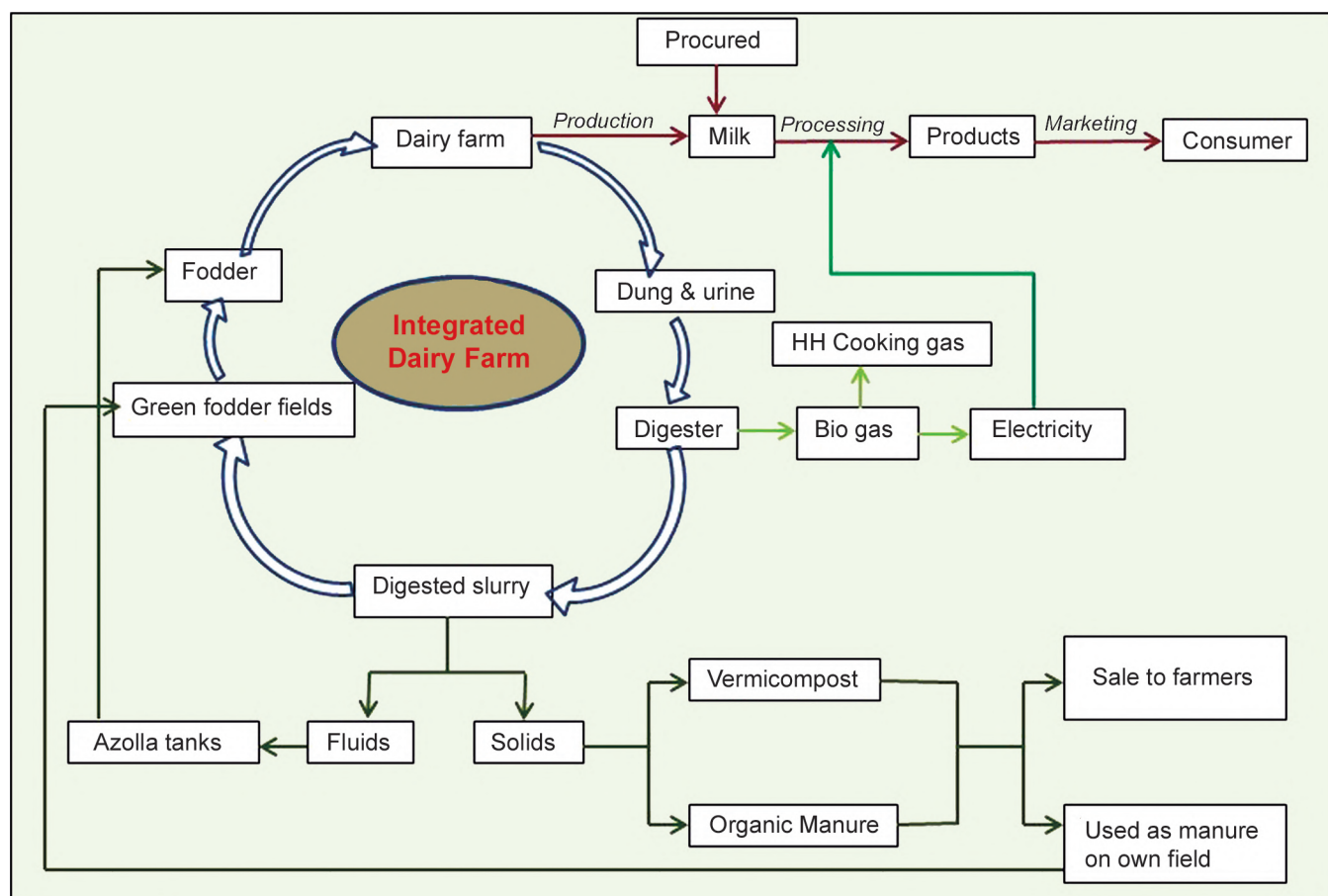


Fig. 1. Integrated dairy farm model

unit is creating energy from manure is becoming increasingly economically viable. The anaerobic digester allows microorganisms to break down organic waste in a process that, in the end, produces methane gas that can be burned just like natural gas. This smooth running unit has potential to generate good income from carbon credits sold. "It's a step in the right direction to allow our dairy to become more sustainable and environmentally sensible", said Shri Rao.

The other additional components of integrated dairy farm consist of feed mixing plant (Fig. 2), biogas unit, biogas-based power generation plant, vermicompost farm (Fig. 3), azolla cultivation unit and organic vegetable farm. As a producer and processor of private label milk and milk products, Chitturi Agro Lactating Foods Pvt. Ltd Dairy continuously searches for improvement opportunities in all steps of the operation, whether it's animal welfare, milk quality, processing techniques, feed and

fodder supply or transportation efficiency. The model adopted in the present integrated dairy farm is given in Fig. 1.

Cost of milk production

Fixed Cost: Interest on fixed capital and depreciation on animals, cattle sheds and machinery were worked out to estimate the fixed cost involved in milk production. The interest on fixed capital was worked out at the prevailing rate of interest i.e. at 12% per annum. Depreciation on fixed capital was worked out separately for milch animals, cattle shed, machinery and equipments by straight line method of estimating depreciation.

$$\text{Depreciation Expense} = (\text{Cost} - \text{Salvage value}) / \text{Useful life}$$

Where,

Cost is the initial cost incurred on the asset under estimation

Salvage value is the resale value of the asset at the end of its useful life

Useful life is the estimated useful years of the asset

The useful life assumed for dairy

animals as follows: Cross-bred cows-productive life 12.5 years; and Local cows and Buffaloes - productive life 10 years.

As the farm maintained animals of different species and age groups. The methodology developed by Patel *et al.* 1983 was applied to determine the relative share of fixed cost attributable to milch stock, the livestock maintained at the farm were converted into Standard Animal Units (SAU's) as per the methodology under reference. The fixed cost was apportioned on the basis of SAU's the following relative weights were assigned.

Local cow:	1.00
Crossbred cow:	1.40
Buffalo:	1.30
Crossbred heifer (> 1 yr.):	0.75
Crossbred heifer (> 2 yr.):	1.00
Buffalo/Local calves (> 1 yr.):	0.50
Buffalo/Local heifer (> 2 yr.):	0.75
Other calves (< 1 yr.):	0.33

Variable costs

These costs include feed and



Fig. 2. Compound feed mixing and preparation unit

fodder cost, labour cost, veterinary cost and other miscellaneous costs.

Feed and fodder cost: The expenditure on green fodder, dry fodder, concentrate and mineral mixture to feed the animals constituted feed and fodder cost. As he adopted collective stall-feeding of their animals, standard animal units approach was applied to estimate costs of green fodder, dry fodder and concentrate and mineral mixture feeding.

Labour cost: The farm employed hired labour for all farm works and no family labour was involved, hence, the hired labour was calculated considering time utilised in various dairy activities and wages paid.

Veterinary cost: Cost incurred on natural service, artificial insemination (A.I.), vaccination, medicines and consultancy/service charges of veterinarian constituted this cost.

Miscellaneous costs: The cost of repairs, electricity, water charges, bucket, rope, can, etc formed this group.

Per unit cost of producing one litre of milk separately for cow milk and buffalo milk was worked out for all the above mentioned costs.

It was observed that, the per litre production cost of milk was ₹ 29.56 and ₹ 20.74 for buffalo milk and cow milk respectively. The feed cost was major cost component for buffalo as well as cow milk which was attributing about 50 % costs. The different components considered in the production costs are given in Table 1.

Cost of milk processing

The components of milk

Table 1. Cost of milk production (₹/litre)

Item	Buffalo milk	Cow milk
Green fodder	4.12	2.91
Dry fodder	2.26	1.75
Concentrate and mineral mixture	15.03	10.5
Labour	4.3	3.02
Veterinary	0.37	0.18
Miscellaneous	1.87	1.15
Fixed cost	1.61	1.23
Gross cost	29.56	20.74

processing costs included costs incurred on packing materials, chemicals and detergents, machinery, labour, transportation, miscellaneous, processing loss and fixed cost.

The item machinery cost comprised of operating cost of machines, repair and maintenance costs of machines established in processing plant. Annual expenditure on machinery was further computed to per unit cost in processing of one litre of milk. Transportation cost included transportation cost involved in transporting milk procured from procurement centre to the plant and distributing processed milk and milk products to the retail outlets and distribution agents. Miscellaneous costs included quality certification charges, licencing and registration charges, insurance charges, etc. Processing loss included loss of milk during procurement, processing and marketing.

The fixed costs included two sub costs which are interest on fixed capital investment and depreciation on machinery and building. The interest on fixed capital was worked out at the rate of 12 % per year. Depreciation cost was calculated for machinery in the plant using straight

line method.

It was observed that gross cost of processing one litre of milk was ₹ 5.14. The component wise processing costs are presented in Table 2.

Feed and fodder supply

As the prices of oilseed cakes have increased due to increased promotion of oilseeds by Government of India, this farm started preparing self-formulated alternative cattle feed at farm by procuring good quality raw materials such as maize, rice bran, groundnut by-products, bengal gram husk, tapioca peels, wheat bran, palm oil etc. in bulk volumes from all over the country wherever available at reasonable price so as to economise feed costs whilst also providing nutritious ration to the animals. He understands that the cost of feeding constitutes the major cost incurred in producing milk and hence, any dairy farm must focus on cutting down feed costs to a maximum possible extent in order to make the enterprise more lucrative.

The fodder cultivation was undertaken in 15 acres of irrigated land, the major fodder crop was

Table 2. Component wise processing cost of milk

Item	Cost (₹/litre)
Packing material	0.81
Chemicals & detergents	0.23
Machinery	0.91
Labour	1.13
Transportation	0.63
Miscellaneous	0.31
Processing loss	0.15
Fixed cost	0.97
Gross cost	5.14



Fig. 3. Entrepreneur showing a view of biogas digester and vermicomposting pit

super Napier grass which supplied 210 tonnes of grass in one year. Berseem, jowar and maize were other fodder crops cultivated on marginal land. In addition, practices like azolla cultivation, hydroponics, ensiling green forages and hay making were other attractive features at the farm.

Converting waste into wealth

The by-products of dairy farm such as dung and urine are collected systematically for producing biogas from which electricity and cooking gas are generated. The biogas plant has six digesters and generates a biogas volume 510 cum/per day, the part of it is used for power generation (between 600-800 units a day) and the remaining gas is processed to produce green cooking gas. It is interesting to note here that the power generation plant is one of the biggest biogas-based power generating plants in Andhra Pradesh, drawing visitors from across India (Fig. 3). The owner has designed a system to flow a part of the digested slurry to feed his in-house agriculture farm as organic fertiliser and the remaining is converted to solid organic fertiliser. The liquid or the water that is separated from the slurry is utilised to grow azolla crop that acts as a feed resource for the dairy animals. A part of the slurry is also used to feed the in-house vermicompost facility as well.

Vermicomposting is carried out throughout the year in well-constructed vermicompost farm consisting 20 beds with size of 25×4 square feet. The annual

vermicompost production has been 180 MT, of which around 30 MT and is used for own farm application and part of the remaining is sold to farmers at ₹ 5/kg and about 2/3rd quantity is sold to the needy farmers at ₹ 8/kg, which is enriched with soil health benefitting microbes (phosphate solubilising bacteria: *Azospirillum* and *Azotobacter*). Altogether, the average monthly sale of vermi compost is approximately 6-8 tons. Moreover, the unit also produces about 320 MT of annual organic compost i.e., combination of slurry and dairy farm waste. The cost of producing 1 kg of vermicompost was found to be ₹ 2.30 per kg of normal vermicompost and ₹ 3.65 per kg of enriched vermicompost.

Cost and returns of milk

The average milk production at farm was 916 and 523 litres per day of cow milk and buffalo milk respectively while the average daily procurement was 1319 and 794

litres per day of cow milk and buffalo milk respectively. The procurement cost of milk was observed to be ₹ 27.68 and ₹ 35.54 per litre for cow milk and buffalo milk respectively. The retail cost i. e., the costs accrued from the point of production of milk up to milk sold to ultimate consumer was ₹ 26.68 and ₹ 35.54 per litre of cow milk and buffalo milk respectively. Similarly, the costs accrued from procurement up to milk sold to ultimate consumer were ₹ 33.69 and ₹ 41.55 per litre of cow milk and buffalo milk respectively. It was observed that the average daily selling quantity of milk by the firm was 3,225 litre of cow milk and buffalo milk put together and the average selling price was ₹ 40.21/litre. The total cost including production/procurement, processing cost and marketing cost was ₹ 12.05 lakh / day and the revenue was ₹ 12.97 lakh. The net annual profit realised by the farm was ₹ 33.37

Table 3. Costs and returns of milk

Items		Cow	Buffalo
Milk production and procurement (litre/day)	Produced	916	523
	Procured	1319	794
Cost of milk (₹/litre)	Produced	20.74	29.56
	Procured	27.68	35.54
Processing cost (₹/litre)	5.14		
Marketing cost (₹/litre)	0.87		
Retail cost (₹/litre)	Produced	26.75	35.57
	Procured	33.69	41.55
Total cost (₹/day)	120,534		
Average quantity sold (litre/day)	3,225		
Average selling price (₹/litre)	40.21		
Revenue (₹/day)	129,677		
Net income (₹/day)	9,143.33		
Net annual profit (₹)	3,337,315		

lakhs at daily net income of ₹. The detailed costs and returns of the milk were presented in Table 3.

Income generation of the farm

The annual income generated at the farm from different sources including production, processing and marketing of milk, sale of dairy animals, sale of vermicompost and organic fertiliser were estimated. The net income generated from all the activities at farm put together was found to be ₹ 42.92 lakhs during 2017-18. Although, the major income contributing activity was milk business vermicomposting business had also contributed considerably to the income generation. The income generated from different sources was given in Table 4.

The owner of integrated dairying model believes that subsidiary interlinking activities of integrated model is the key contributor for his success. While most dairy farmers struggle to realising profit in dairying, Shri Rao has realised profit before deducting tax (PBDT) of ₹ 41.86 lakh during the year 2017-18. In his own words, the profit is possible in dairying only by integrating production with processing and selling milk products directly to consumers in the market

Table 4. Annual income generation at farm

Source	Income (in ₹ lakh)
Milk	33.37
Animals	1.50
Vermicompost	5.55
Organic manure	2.50
Total	42.92

and by proper utilisation of dairy farm wastes like dung, urine etc.

Apart from developing his dairy farm, he has also voluntarily trained selective rural youth at free of cost and also provided 90-day training for 120 farmers, 30-day training for 150 farmers and 1-day training to 1,440 farmers. Further, he has provided internship training programme to 17 students of Veterinary College, Tirupati. Until date, the farm has been visited by around 6,500-7,000 farmers from various states like Chhattisgarh, Odisha, Karnataka, Telangana and Andhra Pradesh.

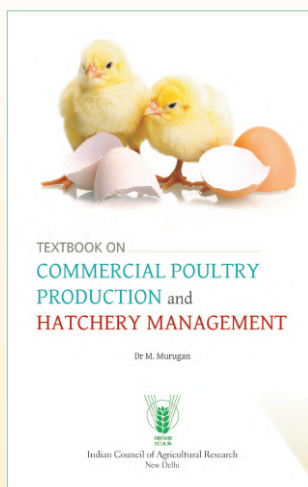
Shri Rao has been recognised by several organisations for his successful work and contribution to dairy. The NABARD has felicitated him during the year 2012 for his valuable contribution towards agriculture and rural development. Ultimately he ends up being honoured with “National Dairy Farmer” award during “Krishi Vasant” in Feb. 2014 by Government of India.

CONCLUSION

Dairy is an important source of additional income for farmers Milk processing will benefit through value-addition. Mr. Narasimha Rao has proved dairying as a profitable and sustainable agri-venture with his “Integrated Dairy Farm – a complete cycle, zero waste initiative” model. The organized dairy sector in India (both cooperatives and private) is presently handling only 40 % of total milk production in the country. Thus, there is a wide scope for processing of milk and manufacture of milk products at farm gate. As the principal milk producers in the country are small dairy farmers, Farmers Producers’ Company (FPC) could be the tool for successful aggregation of small farmers. Overall, it is worthwhile to replicate such an integrated prototype models demonstrating effective utilisation of available resources as well as converting wastes into wealth among interested farmers and/or new agripreneurs as a means of sustainable income.

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TECHNICAL SPECIFICATIONS

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