

Energy auditing of dairying in Perumalpatti village of Thoothukudi district

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Abstract: A study was undertaken in dairy to assess the energy use pattern in Perumalpatti village of Thoothukudi district. The objectives of the study were to collect the data on energy use pattern in dairy, to workout the energy consumption for different operations and to study the energy economics. Simple percentage analysis and average analysis for different energy sources were utilized for interpreting the results. The average total operation-wise energy consumption was found to be 14.71 MJ per farm holding and total energy consumption was found to be 667.66 MJ per farm holding. The major energy contributing source was dry fodder (85 %) and green fodder contributed only 2.26 per cent. The total output energy per farm holding was 335.99 MJ. The output-input energy ratio was 0.5. The specific energy consumption was 31.43 MJ per liter of milk. (*Key words:* Energy auditing, Dairy)

Energy availability is in depleting trend due to the exhaustive and inefficient usage by mankind. The available energy has to be utilized properly to prolong the availability for some more time. Auditing each and every operation and sources of energy in household, agricultural and industrial sector can help in identifying major energy consuming operations and over utilization of energy sources. These lead to proper usage of energy in different systems through better energy management.

Among the various energy sources available in rural sector, cattle population still plays a major role in providing much needed energy for household and agricultural sector. Survey conducted in the last four decades (Anonymous, 1971, 1981, 1991) revealed that the cattle population is in decreasing trend and the reduction is mainly attributed to draft animals, while population of cow and buffalo used for milking is marginally increased. Rapid population growth requires milk for its energy supplement and in future energy consumption in dairying will have to be done to effect considerable energy saving. In this context, a study was under taken to assess the energy use pattern in dairying in Perumalpatti village of Thoothukudy district in South Tamil Nadu.

Materials and Methods

Perumalpatti village is one of the representative villages of southern zone of Tamil

Nadu for energy assessment studies in crop production system, identified by ICAR scheme on Energy Requirement in Agricultural Sector (ERAS). The proforma was structured and supplied by ICAR has been used in this study to collect the data. Survey has been conducted during 1999 and data on energy consumption for different operations and sources were collected from all the cattle rearing farmers of the village. The total cattle population of the village was 247, out of which lactating animals constitutes 64 per cent.

The physical components of the surveyed data were converted to energy components in terms of MJ (Mittal and Dhawan, 1988). Total energy consumption and output were calculated. Simple percentage and average analysis for different energy sources were carried out for interpreting the results. Human energy utilized in terms of male, female and child labour for different operations like feeding, watering, shed cleaning, milking and medicating was estimated and presented.

Results and Discussion

In dairying, different forms of inputs like cattle feed (dry fodder, green fodder, paddy straw, oil cake etc.) and human labour (male, female and child) are the major sources of energy involved. The different operations involved are feeding, watering, shed cleaning, milking and medicating. In this village, only human energy has being utilized for all these operations, in the form of man-hr, woman-hr and child-hr.

Table 1. Total operational hours and energy consumption

Sl. No	Particulars	Average time consumption (hrs)	Average energy consumption (MJ)
1	Male	4.52 (36)	7.45 (44)
2	Female	5.16 (44)	7.46 (44)
3	Children	4.46 (20)	2.10 (12)
	Total	14.14 (100)	17.00 (100)

* Figures in the parentheses indicate percentages.

Table 2. Source-wise energy consumption

Sl.No	Particulars	Average energy consumption, MJ per farm holding
1.	Human	17.00 (03)
2.	Dry fodder	572.25 (85)
3.	Groundnut cake	21.10 (03)
4.	Wheat husk	17.25 (03)
5.	Paddy straw	25.00 (04)
6.	Green fodder	15.06 (02)
	Total	667.66 (100)

* Figures in the parentheses indicate percentage

Table 3. Output from dairy enterprise

Sl. No	Particulars	Average production per farm holding	Average energy MJ per farm holding
1	Milk (lit)	21.25	82.86 (25)
2	Cowdung (kg)	24.20	253.13 (75)
	Total		335.99

* Figures in the parentheses indicate percentage energy values.

Total operational hours and energy consumption

The energy consumption for all these operations is given in Table 1. In most of the farms, female labourers were engaged for shed cleaning, watering and feeding. Women labourers spent 44 percent of total hours in the dairying activity. This was 8 per cent higher than the time spent by the male labourers. The total operation-wise energy consumption was 17 MJ per farm holding. Both the female and male

labourers contributed equally 44 per cent of the total energy, as the energy equivalent of male labourer is higher than female labourers'. The involvement of child-labourers was less than 15 per cent, as very few children work for their own family cattle.

Source-wise energy consumption

Besides human energy, other sources like dry fodder, paddy straw, wheat husk, groundnut

cake and green fodder were used for feeding. As the village is located in dry part of southern zone, dry fodder consumption was more in cattle feeding. Paddy straw was not being utilized as a major cattle feed because, paddy is not a predominant crop in the region. Sourcewise energy consumption in dairy is presented in Table 2.

Total energy consumption was found to be 667.66 MJ per farm holding. The major energy contributing source was dry fodder (85%). As farmers resort to grazing their cattle during their leisure time the contribution of energy on account of green fodder was as low as 2 per cent of total energy utilized. The total energy consumption for feed and fodder was 97 per cent, which is on par (96 %) with the study conducted by Bhatnagar and Panesar, 1989.

Energy output from dairy enterprise

The outputs from dairy enterprise are milk and cow dung as product and by-product respectively. The average production of milk and dung in the village was observed to be 21.25 l and 24.20 kg respectively in a farm. The production and energy from these outputs are given in Table 3. The average total output energy per farm holding was 335.99 MJ. Out of the total production of 1062.30 l of milk per day in the village, farmers selling 1010 l locally and the balance was utilized for self-consumption. The milk production was higher than that of a representative village in cotton belt of Punjab as most of the cattle in Perumalpatti village were cross bred (Pannu, *et al.* 1993). The output input energy ratio is 0.5 and the specific energy consumption was 31.43 MJ per l. of milk.

Conclusions

The major energy consumption in dairy enterprise was feed and among the feed materials, dry fodder consumption was the largest. Dry fodder contributed 85 percent of total energy consumption. Better efficiency in energy management may be achieved, if farmers spend more time in grazing their cattle.

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