Survey on smallholder dairy farms in the Mid-Country, Sri Lanka.

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Summary

On smallholder dairy farms (average 2.7 cows) 40 cows and their calves were followed over a period of one year. Calving interval was 453 days, interval calving to first heat was 106 days and calving to conception 175 days. The number of services or inseminations per conception was 1,6; natural service was more successful than artificial insemination. Inefficient oestrus detection was the major cause for poor reproductive performance. Average milk production up to six months postpartum was 1225 litres with a peak yield of 8.2 litres. Quantities of concentrate fed (2.5 kg/day) were not related to the yield and remained constant. Average birth weight was 27 kg; daily growth rate up to six months was 272 g. Mortality up to six and twelve months was 18 and 40% respectively. Deficient colostrum feeding and omphalitis were common. Gastrointestinal nematodosis and coccidiosis were present but levels of infection and absence of clinical signs did not justify blind treatments. It is suggested that although husbandry and veterinary problems exist, economic factors like low milk price and high cost of inputs are the major causes for stagnancy in the smallholder dairy sector in this area.

Résumé

Quarante vaches et leurs veaux ont été suivis durant un an chez les petits éleveurs laitiers (2,7 vaches en moyenne). Les intervalles entre deux vêlages étaient de 453 jours, entre vêlage et premières chaleurs de 106 jours et entre vêlage et conception de 175 jours. Le nombre d'inséminations ou de saillies par conception était de 1,6. L'emploi de taureaux était plus efficace que l'insémination artificielle. La détection inefficace des chaleurs était la principale cause des mauvais résultats de reproduction. La production laitière moyenne à 6 mois était de 1225 litres avec un maximum journalier de 8,2 litres. La quantité de concentrés donnée n'était pas liée à la production et est restée constante. Le poids moyen des veaux à la naissance était de 27 kg et le gain journalier jusqu'à 6 mois de 272 g. La mortalité à 6 et 12 mois était de 18 et 40%. Insuffisances d'apport colostral et omphalites étaient des problèmes communs. Nématodoses gastro-intestinales et coccidioses étaient aussi présentes mais les degrés d'infection et l'absence de symptômes ne justifient pas le traitement systématique des veaux. Il est suggéré que, bien que des problèmes d'élevage et de santé existent, la stagnation dans le secteur des petits élevages laitiers est principalement due à des facteurs économiques tels que le bas prix du lait et le coût élevé des investissements.

Introduction

Smallholder dairy farms constitute the vast majority of cattle farms in the Mid-Country, Sri Lanka, where 75% of farms are less than two acres (1). The development of dairy farming as a part-time activity is encouraged by the Government as a means of increasing family incomes in rural areas. However, the performance of the animals appears to be poor and the profitability of these holdings is not sufficient to encourage expansion (3). Several factors have been said to contribute to this situation: high cost of feed concentrates and low farm gate price of milk (9), as well as long calving intervals and high calf mortality rates, the last-named causing a shortage of mature females (11). Information on husbandry practices on smallholder dairies of the Mid-Country, Sri Lanka, has not been published and can only be found locally. This survey studied their current management practices and their husbandry and veterinary problems.

Materials and methods

This survey was conducted in the Peradeniya-Galaha valley located in the Mid-Country (300-900 m.alt.) Wet Zone of Sri Lanka. The area, approximately 30 km², receives an average of 2000 mm of rain per annum and has a drier season from January to March; air temperature averages 20°C min. to 28°C max.. Cattle farms have no pasture. Cows are usually kept indoors and are fed with grass cut on wastelands. Some animals are tethered on road sides for grazing. The milk collection is organized by cooperatives; records from these societies estimate the cattle population in the survey area at 2000 and show that, on average, farmers own 2.15 milking cows plus their offspring and have a daily milk production of 5.3 litres.

A total number of 40 cows in late pregnancy or recently calved, were selected at random between March and August 1987, on 33 farms visited by the Veterinary Ambulatory Clinic of the University of Peradeniya (8). Each farm was visited before 10 days postpartum. While calf and dam were examined, general information about farm management level and animals was collected. Later, fortnightly and then monthly visits were paid to the farm, until the calves reached the age of six months. A control visit was made approximately one year after calving to follow the reproductive status of the cows and the development of their calves.

During the first visit, data collected about the cow included age, origin, number and date of calvings, length and yield of previous lactations, use of natural service (NS) or artificial

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insemination (AI). Any problems related to calving, postpartum period or lactation were recorded. During each subsequent visit information on daily milk yield and feeding, eventual oestrus detection, mating or insemination was collected. During the final visit, a last checkup of the dam's reproductive status was done.

During the first visit, the farmer was asked about colostrum feeding and navel disinfection. The calf was clinically examined, weighed and sketched for identification. Blood samples were collected, to determine the colostral immunoglobulin level using a zinc sulphate turbidity test (ZST) (13) and to measure the packed cell volume (PCV) using a portable centrifuge. During each subsequent visit, the calf was examined, weighed and blood was collected for PCV determination and to assess the total plasma protein level using a pocket refractometer (17). The farmer was questioned on calf feeding and anthelmintic treatments. At the age of 5 weeks, 3 months and 6 months, faeces were collected directly from the rectum for parasitological examination. Faecal egg counts were carried out using the modified McMaster method, to an accuracy of 1 egg counted representing 50 eggs per gram (EPG). Samples were cultured at 26°C for 7 days to provide larvae for identification (2, 10).

During the entire period of the trial, no attempts were made to interfere in the existing management; in case of illness, treatment was given only if the animal's life was in danger.

Results

Of the 40 cows selected for this survey, two delivered full term dead calves. Six others were sold: one after the death of its calf a week postpartum, three others together with their male calves before 4 months postpartum and the two last ones because they had not conceived at 8 months postpartum. One cow was transferred with her calf and another one culled at 7 months postpartum. Two male calves were sold at 2 weeks and 4 months; but the latter could be followed subsequently. Eight others (six males and two females) were sold between 6 and 12 months old. Therefore, of the original 40 cows and 38 calves born alive, 36 and 32 dams, and 34 and 25 calves could be observed up to six and twelve months, respectively.

TABLE I
Characteristics of the 33 farms surveyed

Quality of Cattle shed	Number of farms	Type of feeding	Number of farms
Cement floor	22	Zero-grazing	15
Calf pen	9	Concentrates	31
Feed trough	22	Mineral mixt	21
Water trough	6		
Number of animals per farm		5.4 (1 to 32)	
Number of cows per farm		2.7 (1 to 16)	

Farm characteristics are summarized in Table I. All animals were crossbreds between Friesian, Ayrshire, Jersey or Lanka (*Bos indicus*). Farmers who were not using zero-grazing were combining tethering and stall-feeding. The concentrate of choice was coconut meal fed twice daily with large quantities of water and sometimes given in combination with rice bran (in three farms); rice bran alone was given in two farms. Cows were fed grass (mainly *Panicum maximum*) and concentrates after milking (6:00 a.m. and 2:00 p.m.).

On average, cows were 6 years old (range 2-12) and in their 3rd lactation (range 1-9). Half of them had been purchased, mainly as pregnant heifers.

TABLE II
Reproductive data of the dams

History of surveyed cows		Following Pregnancy (Period of survey)	
Age at first calving (n = 4)	33 mth (26-39)	Nb of cows examined	32
Latest calving interval (n = 15)	511d. (337-994)	Nb having conceived	26
Calves conceived after NS (%)	72	Interval calving/1st heat (n = 29)	106d
Conception rate after 1st NS (%)	59	Interval calving/conception (n = 26)	175 d.
Conception rate after 1st AI (%)	27	Av.Nb. insemination/conception	1.6
Av.Nb.insemination/conception	2.1 (1-6)	Av.calving interval (n = 26)	453 d.
		Calves conceived after NS (%)	58

( ): Range

Reproductive data of the dams are listed in table II. Clinical examinations and analysis of the breeding records of the six cows still non pregnant one year postpartum suggested their infertility to be the result of inefficient oestrus detection or negligent management rather than of pathological problems.

The average quantity of milk collected by the farmers up to six months after calving (183 days) was 1225 litres (range 395-2295), with a mean peak yield of 8.2 litres (range 3-15). The 33 cows fed with coconut meal (average 2.5 kg/day); range 0.5-5) had an average production of 1265 litres and a peak of 8.5 litres. The two cows fed only with grass gave 600 litres with peak yields of 5 and 6 litres. Quantities of concentrate fed were not related to the milk yield and remained fairly constant; it was fed twice daily with large quantities of water and this was often the only source of water for the cow. Four farmers gave concentrates during the dry period.

Health problems of the cows were retained placenta (6), mastitis postpartum (2), prolapsus uteri (1) and milk fever (1). All recovered after treatment. The major complaint of the farmers was the lack of oestrus signs.

The development of the calves is summarized in Table III. A clear weaning at 60 or 90 days occurred only in 7 farms. These calves (n = 9) were later being fed 0.5 kg coconut meal daily, in addition to grass. Others (n = 19) were allowed to suckle a little, mainly after milking, during the entire six months period and were allowed to share the ration of concentrates of the dams.

TABLE III
Evolution of calves up to one year of age

Number of animals		Weight	
Born alive	38 (18/20)	Average (kg)	
Followed up to:		at birth	27 (25/27)
6 months	34 (18/16)	at 6 months	272 (289/242)
12 months	25 (15/10)	Average weight gains (g/day)	
Mortality up to:		1st month	310 (325/293)
1 week	3 (1/2)	15th month	267 (288/245)
6 months	3 (2/1)	Mortality rates at:	
12 months	7 (5/2)	6 months	18%
		12 months	40%

(/): (Females/males)
ZST : zinc sulfate turbidity test

All seven animals with low ZST readings suffered from neonatal diseases like enteritis (n = 3), omphalitis (n = 2) or

septicaemia (n = 2) and three died in spite of antibiotic treatment. Of the other calves with satisfactory ZST readings, 7 had omphalitis and 3 enteritis before the age of six months; three died, from peritonitis, enteritis and unknown reason. Between six and twelve months of age, two died accidentally while tethered and two others from foot-and-mouth disease and unknown reason. The calf mortality rates below six and twelve months were 18 (n = 34) and 40% (n = 25), respectively.

Almost 25% of all calves had omphalitis. Three were treated and one died; the others recovered spontaneously. Few farmers (n = 14) disinfected the navel and only 9 of these kept the calves in a separate pen. The most commonly used drug was margosa, a fly repelling oil obtained from the fruits and leaves of *Azadirachta indica* (Meliaceae). Also used were Iodine tincture and ash.

The average total plasma protein was 5.7 g/dl (range 4.8-6.4). Individual values remained fairly constant from the second till the sixth month. The average PCV during the first week of life was 35 (range 26-52). It gradually decreased to 25 (range 14-32) in the sixth month, with no marked differences between farm groups. Two isolated higher values (50 and 48) were probably due to temporary dehydration.

TABLE IV

Faecal oocyst and egg counts of the calves at different ages

		OPG (>1000)	*Toxacara vitulorum*	*Strongyloides papillosus*	*Strongylida*
5 Weeks (n = 30)	Number pos	14	11	9	3
	Geom.mean	X:20000	X:3400	X:2500	X.140
	Range	(4000-260000)	(250-34400)	(100-50000)	(50-1100)
3 Months (n = 28)	Number pos	3	1	6	18
	Geom.mean	X.11600	600	X:320	X:200
	Range	(6200-24000)		(100-1000)	(50-800)
6 Months (n = 27)	Number pos	1	0	2	22
	Geom.mean	12000		X:300	X:350
	Range			(200-500)	(50-2800)

Faecal oocyst and egg counts of calves are listed in Table IV. At 5 weeks, faecal examinations showed presence of coccidia (*Eimeria ellipsoidalis, E. auburnensis, E. zuernii* and *E. bovis*) and *Toxocara vitulorum*. All these infections resolved spontaneously. At 3 and 6 months, the majority of samples contained Strongylida eggs. The larval composition was *Cooperia* sp 80%, *Oesophagostomum* sp 11%, *Haemonchus* sp 4%, *Mecistocirrus digitatus* 4% and *Bunostomum phlebotomum* 1%. 50% of the calves received one worm treatment around 3 months; 15% received two treatments with 1 to 4 months interval; the others were never dewormed. The drugs used were febantel and piperazine, depending on their availability. No difference in egg counts at 3 and 6 months was found between the treated (Mean: 150 EPG) and untreated calves (Mean: 100 EPG). Up to six months no heavy tick infestations were noticed in calves.

Discussion

The results of this survey should be interpreted with caution. The difficulty of obtaining reliable information from farmers and the higher interest they may have shown in animals simply because they were involved in the survey are factors which might have influenced the results of the observations.

Small farms are maintained by families whereas, on somewhat larger farms, labourers take care of the animals. No difference in productivity was noticed between the two groups which suggests that all farms shared the same problems.

Oestrus detection was the major cause of poor reproductive efficiency. Mohamed (14) in a survey on reproductive performances in cattle in small farms found a mean interval from calving to first service of 155 days and 2.9 services per conception; inefficient oestrus detection was the main cause for low conception rates. Further study should determine the relative importance of suboestrus in cows and inefficient detection by farmers.

The majority of calves in our survey were born after NS. When offered the choice, farmers prefer AI to NS but the final decision depends on the availability at the time of oestrus. Breeding opportunities were missed because services were not available when needed. A better conception rate was obtained after the first NS than after the first AI. As discussed by Nell (15), the main objective of smallholders in breeding their cows is to produce milk and the calf is of secondary importance. Farmers are more interested in short calving intervals than in genetic improvement of their animals. Mohamed (14) noticed that only 61% of AI done in the field were performed on cows in oestrus. This suggests that inseminators are not in a position to advise the farmers about oestrus detection. Distribution of bulls in the villages had been recommended by Nell (15).

Although a high milk yield is the main, if not the only objective of farmers, know-how to increase production is lacking. Farmers did not realize the impact of the animal's general condition, feeding and water intake on milk production. None of the farms followed any specific feeding programme and animals which were fed concentrates received the same ration throughout lactation, regardless of the level of production. The importance of the quality of grass was underestimated. The limited water supply in sheds and the unequal periods (8 and 16 hours) between the two daily milkings could also have a negative effect on the yield. Farmers did not have any knowledge on the appropriate level of nutrition for optimum production. The high cost of concentrate feeding related to milk price may explain its limited use. Health problems observed in cows were not representative for the prevalence of these conditions in the area as some of the animals were included in the survey after farmers had called for veterinary help. In general, farmers did not complain about dystocia. This is probably due to the relatively small foetuses. The two dead calves delivered during our survey could not be examined and cause of stillbirth is unknown.

The reliability of plasma immunoglobulin levels as an estimation of the immune status and viability of neonatal calves is disputed (6 and 21). In this survey, 12 calves had health problems requiring veterinary help before the age of six months. The seven animals with low ZST values were all found in this group and contributed 50% of the mortality at six months. The importance of colostral immunity appears to be clearer where disease and mortality rates are high (7). Most farmers know colostrum should be fed but only few know why and when it should be given.

The average birth weight was 27 kg. In the Sri Lanka low country where temperature and rainfall are higher,

Tilakaratne and Matsukawa (20) found a much lower value (17.4 kg) in animals of the same breed. The low daily weight gains observed (272 g/day) are the expression of poor feeding. The majority of calves were allowed to suckle twice daily but the amount of milk ingested was unknown. Three calves fed four litres per day from the bucket grew an average of 344 g/day. Most farmers don't completely wean their calf and no feeding programme is followed. Calves are neglected as they do not bring any immediate financial return and because their feeding is considered as a direct loss of income. Kopalasuntharam (11) reports an average growth rate of 320 g/day in heifers included in a subsidized rearing programme. For religious reasons, most farmers do not rear animals for meat production. Therefore, male calves are neglected, while heifer calves receive better care (4). Of 20 males born, only 4 were still on the farm after one year; they did not have significantly lower growth rates than females and the mortality rate was the same in both sexes. This suggests that females did not receive a lot more care than the minimum supposedly given to males. Farmers prefer to buy a mature female rather than to take the financial risk of rearing it. This is reflected in our survey by the number of cows purchased as pregnant heifers and the number of dams (n = 6) and female calves (n = 2) which were sold during that year. A similar observation was reported by Nell (15).

On large government farms, mortality rates up to six months of age vary from 12% (5,16 and 19) to 20% (20). In a pilot project at the smallholder level, Ariyaratne (4) noted a mortality of 30%. In our survey, 40% of the calves died before one year of age. Causes of mortality were various and death occurred equally in all age groups. Gastrointestinal parasitism is regarded as one of the major factors contributing to the poor condition of calves at the smallholder level and regular deworming from the age of one month onwards has been recommended (12). The faecal egg counts in different age groups should be considered together with the larval composition of samples. At five weeks, half of the calves had coccidial infections, but the most pathogenic species (*E. bovis* and *E. zuernii*) were only present in limited numbers. Infection levels of *T. vitulorum* and *Strongyloides papillosus* recorded in this study have no specific pathogenesis in cattle. At three and six months, a majority of samples contained Strongylida eggs but counts were lower than those considered indicative of pathogenic infestations for the different species involved (18). It is suggested that gastrointestinal nematode infestations do not, as a general rule, constitute a problem in smallholder farms. Therefore, regular, blind and costly treatment are not justified.

It is concluded that the major reason for stagnancy in the smallholder sector is the lack of economical incentive resulting from the low price of milk and the high cost of inputs. Applied information given through the milk collecting societies could help farmers in solving most of health and husbandry problems.

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