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Community-Based Productivity Veterinary Services Increase Smallholder Dairy Farms' Income and Number of Cows for Breeding at Mymensingh of Bangladesh

Research Article

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ABSTRACT

We reported here data from a productivity veterinary service that was participatory planned and delivered on farms at the Kanihari Union belongs to Mymensingh District of Bangladesh. We used a set of five forms and a breeding calendar on farm visit once in a month to guide service delivery and acquisition of data and to keep the records on general cattle health, reproduction, udder health and feeding management of the farms. Once information were entered into a database application, a summary sheet was produced, which was taken into the farm to guide the activities in follow-up visits. On average, 72% anoestrous cows and heifers resumed their estrous cycle and 64% of repeat breeding cows and heifers conceived when treated. When GnRH was injected at the time of artificial insemination (AI), 73% repeat breeder cows conceived. Sixty four percent cows recovered from mastitis and 87% sick animals recovered when treatment was given based on clinical diagnosis. Majority of clinically diagnosed diseases were endoparasitic infections (19.0%) and anorexia (11.9%). More than 80% farms that received the service had an income increase ranging from US $ 1.0 to $ 43.9 monthly per cattle. Productivity veterinary services increase farmers' monthly income per cattle and number of cows for breeding.

KEY WORDS cattle health, farmer's income, reproduction, udder health.

INTRODUCTION

Smallholder dairy farms are the main producers of milk in Bangladesh (Anon, 2008). A community in the Mymensingh District heavily relies on dairying and hence, rears native cattle and buffaloes to produce milk. Milk marketing is unorganised; however, farmers sell milk at a good price in the Mymensingh city. Productivity of indigenous animals, in particular is low, which is an important constraint that limiting the development of the dairy industry. A participatory rural appraisal (PRA) identified and prioritised constraints that limit the productivity of the industry. These are limited access to veterinary service resulting in high animal mortality, absence of AI services, lack of farmers training resulting in poor management practices, high calf mortality, seasonal scarcity of forage and poor reproductive performance of animals. In coordinated research, PRA proved effective in studying smallholders' dairying in Bangladesh (Shamsuddin *et al.* 2007). We, therefore, made a participatory project aimed at establishing a community-based productivity veterinary service to be delivered on farms in this community.

MATERIALS AND METHODS

An on farm community-based productivity dairy veterinary service was delivered to 200 smallholder dairy farms at the Kanihari Union belongs to Mymensingh District of Bangladesh during the period from September 2007 to October 2009. Family livings in this community heavily relied on dairying with cattle and buffaloes. The farm families together had 714 total animals (3.58 per farm) with 224 (30.7%) lactating animals on an average of two years data.

We developed a set of five forms and a breeding calendar on farm visit once in a month to guide service delivery and acquisition of data and to motivate farmers adopting preventive measures like fertility control, deworming, vaccinations and feeding animals properly to sustain production (Shamsuddin *et al.* 2009). Once data on the forms were entered, the database application produced a herd summary, which was taken to the farm the next monthly visit to follow up the outcomes of interventions made.

Form 1

On the first visit in a farm, form 1 was used to record farm ID, farmer's name and address and date of farm visit. Form 1 guides recording data on farm inventory, preventive health management, feed management and a list of treated animals.

Farm inventory included information on animal type, current numbers of different kinds of animal, milk production and milk unit price. If any animal was sold, its type and price were recorded. If any animal died, its type was recorded. We recorded information on deworming, vaccination, teat dipping, examination of foremilk and others, if any. The date of deworming and vaccination with their costs and application were recorded. During initial visit, the amounts of feed given to animals were recorded with feed costs and, if necessary, interventions were recommended and recorded in the form. Any animal treated at least once was recorded with a presumptive diagnosis. The form also had an option to record the herd nutrition condition (1 to 5 in 0.5 intervals; Nicholson and Butterworth, 1986).

Form 2

Form 2 was used to gather information on date of immediate last service, inseminator's name, number of service, cost of each AI and pregnancy diagnosis The form guided recording farmer's complaints and taking history on previous parturition, puerperium, retained placenta, number of services used for last conception and milk production of a cow with reproductive problems. The animal was examined and temperature, heart rate, respiratory rate, rumen contractions-frequency and strength and nutrition condition were recorded. The genital tract and ovarian cyclicity was evaluated by inspection and per rectal examinations. In the follow up visit, the treatment result was examined and further necessary interventions were adopted.

Form 3

This form was used to record data on mastitis including history, physical examinations of the cow and its udder, visual inspection of milk and California mastitis test (CMT). Findings of the examination were scored and recorded, and mastitis was diagnosed and classified into mild, moderate and severe, which were important with regard to the treatment. The form had a guideline for the management of mastitis that also includes provisions of taking data on milk culture. During the follow up visit, the treatment result was recorded and further necessary interventions were made.

Form 4

This form was designed to guide examination of sick animals other than those with reproductive problems and mastitis to make a clinical diagnosis and prescribe treatments and record relevant data. The farmer's complaints and other necessary history were recorded and the animal was examined for heart rate, respiration rate, rectal temperature and rumen movement. Faeces, hydration, appetite and nasal conditions were examined and scored where necessary. A clinical diagnosis was made and treatments were given. Farmers' compliance and cost of treatments were recorded and further necessary interventions, if any, were prescribed during the follow-up visit.

Form 5

This form was used to record incomes from milk sale and home use, manure sales and / or home use, sales and slaughter of livestock and expenses for feed purchase and freight, health care, labour and maintenance.

Data acquisition

A microsoft access based database application was customised matching with the forms to record and analyse the data and to produce a herd summary which guided activities of the farm during next visit. Data acquisition was done guided by the forms (form 1 to 5) by the veterinarian during his regular farm visit. Farm families were divided into 20 groups where each group composed of 10 farms and one farmer of the group served as the leader. On any particular day of the month, the project veterinarian visited the community of ten farms providing proactive veterinary service, assuring compliance to optimal health protocols, and discussing future plans with the dairy producers and particularly with the group leader. The twenty leaders from the groups made the farmers' association.

In addition, the farmer could call a veterinarian if any emergency or general cattle health care issue arose in the farm for a fixed charge.

Data management and analysis

Data from customised database application were exported to a Microsoft Excel Workbook (2002). Only farms that accepted the intervention were included. Descriptive statistics were computed and histogram is drawn to figure out the changes farm's income from per cattle per month. Farms that had data for at least three visits were included in the analysis of economic impact of interventions. Net income (gross income-gross cost) was calculated for each animal and day before and after interventions. The information obtained on the first visit was considered as before intervention data. Data from subsequent visits were averaged to calculate after intervention data. The initial net income from individual farms were deducted from the after intervention net income to determine changes in farmers' income from the service.

RESULTS AND DISCUSSION

Anoestrus cows and heifers management

On average, 72% cows and heifers resumed estrous cycle after treatment [Table 1 (a-b)]. Farmers considered 39 cows as anoestrus; but those cows were actually cyclic as they had corpus luteum on their ovaries [Table 1 (b)]. These cows were treated with PGF2α and inseminated either once a time at estrus detected or twice at 12 hour interval and 71 to 84 % of such treated cows and heifers were presumed pregnant (non-return by Day 56 or diagnosed pregnant).

Management of cows and heifers that failed to conceive after three services

The veterinarian examined 45 cows with the history of conception failure after more than three services and prescribed treatments accordingly. Two insemination services at 12 hours interval were given to 18 animals of those 13 (72%) animals non-returned or became pregnant. Fifteen animals were treated with GnRH preparations at the time of AI and 11 of those (73%) non-returned or became pregnant [Table 1 (a)]. Twelve animals claimed to be repeat breeding but with cloudy vaginal discharge were treated with intrauterine infusion of antibiotic, only 5 (42%) of those non-returned or became conceived [Table 2 (b)].

Mastitis cows management

Twenty five cows with udder problems were examined and treatments were prescribed. Sixteen (64%) of 25 cows showed normal udder and milk on follow-up visits (Table 3).

Management of general diseases of cattle

One hundred and five animals were examined and treatments were prescribed. Treatment is received in 83 cases. Most of the treated animals recovered from illness and five animals died (Table 4). Distributions of frequency percentages of different disease are shown in the Figure 1. An overwhelming majority of clinically diagnosed diseases were endoparasitic infections (19.0%) and anorexia (11.9%).

Effects of productivity veterinary service on changes of farmers' monthly income per cattle

Change in the farmer's monthly income per cattle due to the service delivered in Mymensingh is shown in the Figure 2. More than 80% farms had increased their income due to the productivity veterinary services; and this income increase ranged from US$ 1.0 to 43.9. Out of 115 farms, income per month is remained constant in only 2 farms and 8 farms had loss after receiving our intervention.

Community-based productivity veterinary services increased income in majority of dairy farms in this present study. The positive effect of herd health management or productivity veterinary services were demonstrated by others (Dijkhuizen *et al.* 1984); however, reports available on such programmes in smallholders dairy farms are scarce (Suriyasathaporn and Singhla, 2008).

Some farmers did not achieve income increase from our services. Firstly, one year intervention on cattle health and reproduction may not necessarily produce impact on farmers' income because the treated animals are not in production in many cases.

Secondly, there were farms in this study where a lactating cow was not always present. Milk is the major source of income in a dairy farm. Small farms without a lactating cow are devoid of income but have to feed the animals. Veterinary services in such farms do not produce an immediate visible economic impact.

The forms and calendar developed in this study proved useful in getting data consistently from small holders dairy farm families. The database application was helpful for analysing the data collected from the field services and produces a herd summary for guiding the interventions in follow up visits.

A considerable proportion of cows and heifers, with neither corpus luteum nor follicles on the ovaries, were identified anoestrous responded to treatment with a mixed commercial preparation of vitamin A, D_3 and E, or anthelmintics plus A, D_3 and E or nutrition only. No such animals were treated with GnRH. This is because, generally, responses of anoestrous cows to GnRH treatment are poor as such treatment requires the presence of a functional ovarian dominant follicle in ovary (McDougall *et al.* 1995).

Table 1 Anoestrus cows and heifers management with the treatment outcomes

(a) Anoestrus cows and heifers with neither a palpable CL or follicles on the ovaries		
Treatment	No. of cows treated	No. (%) of cows showed estrus following treatments
Anthelmintics + Vitamin A, D_3, E	16	10 (63)
Vitamin A, D_3, E	11	7 (64)
Nutrition	9	6 (67)
(b) Anoestrus cows and heifers with a palpable CL on either of an ovary		
Treatment	No. of cows treated	No. (%) of cows non returned or pregnant
PGF2α + single AI on observed estrus	14	10 (71)
PGF2α + two times AI at 12 hours interval on observed estrus	25	21 (84)
Total	75	54 (72)

A, D_3, E= An injectable preparation of vitamin A, D_3 and E available commercially.
PG= Prostaglandin F2α preparations available commercially.

Table 2 Management of repeat breeding cows and heifers with the treatment results

(a) Cows and heifers claimed to be repeat breeding but with clear vaginal discharge		
Treatment	No. of cows treated	No. (%) of cows non-returned or pregnant
Two AI at 12 hour interval	18	13 (72)
Single AI + GnRH at the time of AI	15	11 (73)
(b) Cows and heifers claimed to be repeat breeding but with cloudy vaginal discharge		
*Intrauterine infusion with antibiotics + AI	12	5 (42)
Total	45	29 (64)

GnRH= commercially available synthetic GnRH preparations.
* Intrauterine infusion with antibiotics + AI= intrauterine infusion of 2.0 IU million procaine penicillin immediately after estrus detection followed by two additional intrauterine infusion of 2.0 million procaine penicillin each at 24 and 48 hour interval after the first injection.

Table 3 Treatments with outcomes of mastitis cows

Treatment	No. of given treatment	No. (%) of positive response
Systemic antibiotic only	6	3 (50)
Systemic antibiotic only + anti-inflammatory drugs	11	7 (64)
Systemic antibiotic + anti-inflammatory drugs + Intramammary antibiotic	8	6 (75)
Total	25	16 (64)

Table 4 Number of treated animals with treatment-outcomes

Indices	Number	Percentages
Animals treated	105	
Treatment accepted	83	
Result of treatment		
Cured	57	69
Some improvement	15	18
No improvement	6	7
Died	5	6

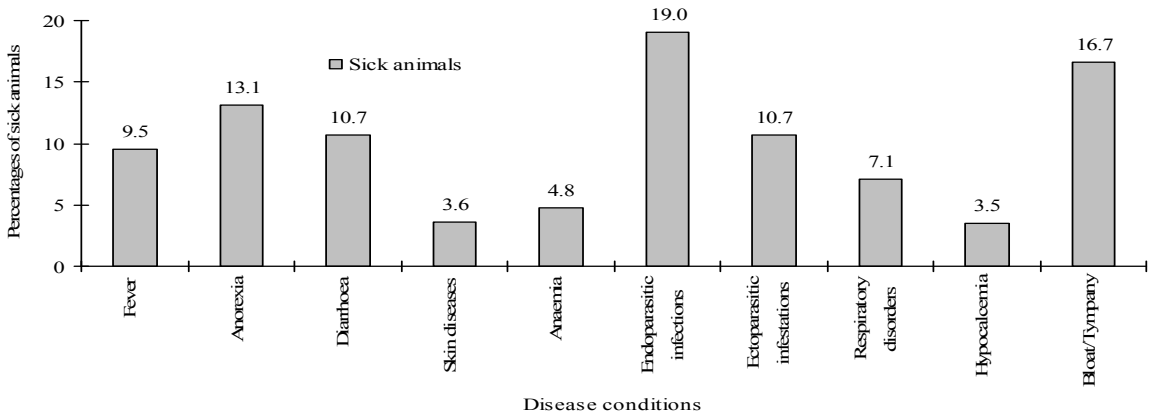

Figure 1 Distribution of frequency percentages of general disease conditions of cattle (n=84)

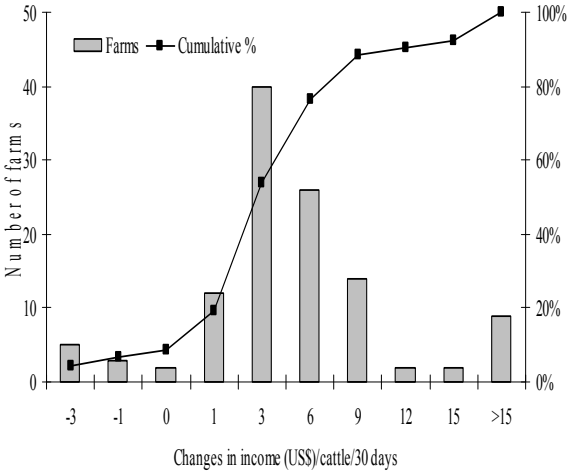

Figure 2 Effects of productivity veterinary services on farmers' monthly income per cattle in Mymensingh of Bangladesh; minimum and maximum differences were US$ -12.6 and 43.9 respectively (number of farms=115)

Whether per rectal palpation of ovaries stimulate cyclicity in anoestrus cows and prepubertal heifers remained to be investigated. The cows and heifers claimed to be anoestrus by farmers but with palpable corpus luteum on ovary on rectal palpation were treated with PGF2α Most of the cows showed estrus following treatment. In this study, clinical mastitis responded well to antibiotic treatment. However, more specific treatment guided by the results of milk culture for bacteria would hasten recovery of animals and reduce the risk of undue milk contamination with drug residue. The preventive programme for bovine mastitis in Bangladesh is quite new. Common cattle health, reproduction and production-related problems were identified by this study. This study also shows that how a community based productivity veterinary services increases farms' net income. This will help designing a private, on farm productivity veterinary services with means of recovering cost to run the programme. A future opportunity would be a foundation of veterinarians that would work hand-in-hand with producers' association for institutionalising a private veterinary service in Bangladesh.

CONCLUSION

In conclusion, the community-based productivity veterinary service increased monthly income per cattle for majority farmers. This study also showed that how a productivity veterinary service increased the number of cows for breeding in a dairy-based community by the effective treatment for the anoestrus and repeat breeding cows and heifers. However, it needs to be further strengthened in terms of consistent farm visit and institutionalizing the service.

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