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Economic Impact of Infertility in Crossbred Dairy Cows: The Case of Eastern Nile Locality, Sudan

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ABSTRACT

The aim of the current work was to estimate the economic loss due to infertility in crossbred dairy cows in Eastern Nile Locality (ENL). A total of twelve farms were followed up for infertility problems during the period 2008 – 2009.The study revealed that 17.31% of crossbred cows were infertile. Accordingly the annual economic loss was estimated as the cost of milk loss, cost of calf loss, cost of culling and the cost of veterinary intervention. The total annual loss accounted to $US 418,779.1, loss per farm was $US 34,898.261 and loss per cow was $US 4,927. Milk loss accounted to To89% f the total cost. Raising the awareness of the farmers towards better management of infertility problems will act to increase their income as well as milk supply.

KEYWORDS infertility, economic impact, crossbred dairy cows; Khartoum State

Introduction

The poor reproductive performance of dairy herd in general and in Holstein Friesian herd in particular, became a major concern all over the World. Increasing calving interval and decline conception rates were confirmed by many authors (Royal, Darwash, Flint, Webb, Woolliams, and Lamming, 2000; Lucy, 2001). It is becoming increasingly apparent, that high yielding cows were unable to conceive under optimum condition (Pryce and Veerkamp, 2001). Infertility problems in dairy herds affect profitability through additional expenditure and reduced income. Reduced income occurs as a result of lengthened calving intervals, lower / inputs or outputs / fixed costs ratios (Sol, Stelwagen, and Dijkhuizen,1984), reduced milk yield, loss of calf crop, increased labor, increased veterinary intervention and treatment costs and increased culling of cows (Bellows and Short, 1994).

In Colorado, 85% of all cows culled for reproductive problems were non pregnant or had become pregnant late in the breeding season (USDAN, 1985). A California report stated 4.5% of the studied total cow population was culled because of infertility (Gardner , Hird, Utterback, Danaye- Elmi, Heron, Christiansen, and Sischo, W.M.(1990). An average costs of $15.00 per cow inventory was reported in NAHMS, when extrapolated to the national dairy herd, average costs of infertility amount to $137 million per year (USDAN, 1990).

Economic losses of stillbirth to the dairy industry in the U.S. just due to the loss of replacement heifers were estimated to be $125 million per year (Meyer, Berger, Koehler, Thompson, and Sattler (2001). Mickelson (1990) found that abortions decreased potential calf crop by 2.3% in beef cow-calf herds of 1,000 cows and stillbirths at 17 and 23 per 1,000 cows in beef and dairy cows, respectively (USDAN, 1988).

Based on Dairy '96 USDAA, (1996) information and assuming a conservative value of a newborn calf at $85 per head, abortion and stillbirths cost beef cow-calf operations $1.90 per cow inventory in lost calves. For dairy operations, abortions alone cost $3.00 per cow inventory in lost calves. Stillbirths and abortion costs are estimated at approximately $64 million yearly for beef cow-calf producers and $27 million per year for dairy producers.

In a study involving almost 123,000 lactating dairy cows, dystocia reduced average milk production by 38.4 kg per cow (Dematawewa, 1997). At the national level, these totals 349 million kg lost milk production and translates into a $12.30 per cow inventory loss. Estimate by Smith, Erb, and Oltenacu (1985) found average dystocia costs of $35 for first-lactation dairy heifers. In Georgia, the annual dystocia costs of $2.70 per cow inventory in beef cattle (USDAN, 1988). When death loss and treatment costs are included, overall studies reviewed, dystocia is estimated to cost $11.90 per cow inventory in dairy operations and $5.50 per cow inventory in beef cow-calf operations. Adding the $12.30 per cow inventory in lost milk production in dairy herds brings the total cost associated with dystocia to $24.20 per cow inventory. Dematawewa and Berger (1997). reported total cost estimate of $ 24.24 per cow.

Costs of treatment of retained placentas in Georgia herds totaled $0.03 per cow inventory in beef operations and $ 0.40 per cow inventory in dairy farms (USDAN, 1988). In Netherlands Van Werven (1992) reported a reduction in 100-d milk production of 237 kg per cow for cows with placentas retained for >12 h compared with cows not experiencing retained placentas. Assuming the same milk loss for the U.S. and the 7.8% rate of retained placentas as estimated by NAHMS Dairy '96 (USDAA, 1996).

Prevention and treatment of metritis in dairy cattle was reported to cost producers $1.30 per cow inventory in Georgia (USDAN, 1988); Ohio dairy farmers spent an average of $8.00 per cow inventory (USDAN, 1990). Total annual dairy industry losses associated with reproductive diseases and conditions would range from $473 to $484 million, (Harris and Montgomry, 2001)

The population of crossbred dairy cows in Khartoum State, Sudan reached 52.8% of the total cattle population estimated at 2, 2843 head (Ministry of Agriculture and Animal Resources, Khartoum State, 2006). About two third of the crossbred cows in Khartoum State were found in Eastern Nile Locality (Ministry of Agriculture and Animal Resources, 2006).

With the progress of the cross breeding program, the foreign blood reached 62.5% in some farms and 81% in others (Ministry of Agriculture and Animal Resources, 2007). This was reflected in improved milk yield reaching 28.4 lbs / day com-

pared to 16.6 lbs/ day in case of the local breeds (Ministry of Agriculture and Animal Resources, 2007).

Although milk yield of the crossbred cows in Khartoum State has improved, however, this was reciprocated by continuous decline in fertility of crossbred cows in the small holders' farms in the State. This constituted one of the main problems facing the dairy production. The low fertility was manifested by increased number of services per conception which leads to increased open days and extending calving interval to 413 days (Ministry of Agriculture and Animal Resources- Khartoum State, 2006). The economic repercussions of infertility were reduced milk yield, loss of calf crop, increased labor, increased veterinary intervention and treatment costs and increased culling of cows due to failure to become pregnant and the resultant loss of income incurred to dairy farmers (Bellows and Short, 1994). Due to all the above mentioned reasons large number of farmers abandoned dairy business. This again bears negative consequences on dairy production and national economy. It is imperative therefore to address this critical problem of infertility in the crossbred dairy cows and its negative impact on farm economy in order to solve this problem.

Materials and Methods

The study Area

The study was conducted in Eastern Nile Locality (ENL), Khartoum State, Sudan. The locality is located between longitude 15 37˚ and 15 78˚ North and latitude 32 32˚ to 32 71˚East. The area represents a typical semi-arid zone with substantial variation in temperature and humidity. In dry summer the average monthly temperature ranges between 23.0and 40.5 C˚, while in wet summer the average monthly temperature ranges between 24.5 and 38.7C˚ with average rain fall reaching 26, 08 mm. In winter the temperature ranges between 17.0 and 33.8C˚.

Methods of data collection

Data was collected during the period (2008-2009). A cross section survey was conducted in which twelve clusters (holdings) keeping crossbred cows were selected from different locations of ENL depending on the consent of the farmer. Crossbred cows in all the selected farms were recorded. Various identification methods such as name, ear tag and colours together with descriptive feature (e.g. broken horn) were used to identify the animals. Direct interview with the farmers beside the observation were used to collect the required data .The identification of cows sustaining infertility problems was based on history, clinical signs. All animals in the selected farms were subjected to repeated clinic-gynaecological examination. The diagnosis was made on the basis of history, observations, rectal palpation, Progesterone level and serological test. Manual procedures were used for treatment of some causes and various drugs, hormones and were also used to treat and handle various infertility cases.

Economic losses associated with infertility problems included the cost of veterinary intervention, expected cost due to calf loss; cost of cows culled and cost of milk loss. The costs due to veterinary intervention include cost of diagnosis and treatment of infertility diseases. These included cost of veterinary drugs, reagents, diagnostic kits and wages accrue to veterinarians.

The cost of milk loss was estimated as follows:

Milk loss per day was considered as milk yield / healthy cow / day - milk yield/infertile cows/day.

Annual total cost of milk loss = milk loss/cow/day x price of milk x300 day x number of infertile cows.

Estimated cost of calf loss = number of infertile cows x estimated price of weaned calve (assuming 50% were males and 50% were females).

The costs of culled cows were estimated as follows:

Cost of a culled cow = price of replacement heifer – price of culled cow.

The total costs due to infertility.

A. The total cost /year.

Annual cost of infertility = Annual cost of milk loss +Annual cost of calves loss +Annual cost of culled cows + Annual cost of veterinary intervention.

B. Average annual cost / cow

Total annual cost of infertility / number of infertile cows.

C. Average annual cost / farm

Total annual cost of infertility /number of farms.

Results and Discussion

The study revealed that infertility problems accounted to 85(17.31%) out of which 87.055% were attributed to direct causes and 12.95% to indirect causes. Follicular cyst, metritis, brucellosis, persistent corpus luteum and inactive ovaries were the main causes.

Economic Impacts due to Infertility problems in ENL

Economic losses incurred to the smallholder dairy farmer in ENL were manifested in cost of calve loss, cost of cows due to culling, cost of milk loss and cost incurred from veterinary intervention.

Cost due to calves loss

Expected calves loss from the total affections was 85 calves
The price of weaned male calf was SDG 650
The price of weaned female calf was SDG 900
The average price of weaned calf was SDG 775
Annual cost due to calves loss = 85 x 775 =SDG 65,875

Loss due to culling of infertile cows

The study revealed that there were 24 cows culled due to infertility during the study period.

Price of replacement heifer= SDG 3000.

Price of culled cow= SDG 1500.

loss due to culling of infertile cows = 24 x 1500 =SDG 36,000.

Loss due to reduction in milk production

The average milk loss per day for each cow was estimated at 24 lb.

Accordingly the total milk loss of 85 infertile cows was found to be 2040 lb per day.

The price of milk = SDG 1.4/lb

The total milk loss was estimated at SDG 2856 per day.

The total loss due to reduction in milk production= 2856 X 300 day= SDG 856800 / year.

The cost of veterinary intervention

The cost of veterinary intervention consists of the cost of diagnosis and the cost of the treatment. Table 1 presents the cost of veterinary intervention during the study period.

Table 1: Total cost of veterinary intervention in the management of infertility problems during (2008- 2010) (SDG)

Cost item	Value	Percentage
Diagnostic Cost	1455	32.3
Treatment Cost	3062	67.7
Total cost	4517	100

The overall economic impact of infertility problems

The total economic loss due to infertility problems was calculated as SDG 963,192 ($US 418,779.1) per year and as SDG 11,331 ($US $ 4,927). Every farmer lost $US 34,898.261 on

average per year. Milk loss constituted the main cost item followed by calf loss.

Table 2: The total financial losses due to infertility problems in Eastern Nile locality per year SDG

Cost item	Total cost	Cost/cow	Cost/farm	%
Milk lost	856,800	10,080	71,400.00	89.0
Calf loss	65,875	00, 775	5,489.60	6.8
Culling	36,000	423.529	3,000.00	3.7
Veterinary intervention	4,517	53,141	00,376.42	0.5
Total cost	963,192	11,331	80,266	100
Total cost in $US	418,779.1	4,927	34,898.261	

***2.3 (SDG) per US dollar**

Conclusion

It was concluded that infertility in ENL acted to reduce dramatically the farmers income mainly as a result of milk loss. This on other hand acted to reduce milk supply due to direct reduction in milk yield, culling of high lactating cows and increased open days. Management of infertility constituted a minor percentage of the total cost indicating that farmers are not so keen to manage infertility problems in their herds. Raising the awareness of the farmers towards better management of infertility problems will act to improve the farmers' incomes.

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