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Economic Losses Associated with Reproductive Disorders of Cows in Settled Cattle Herds in Zaria, Nigeria

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Abstract: A study was conducted to evaluate the economic losses associated with reproductive disorders of cows in settled cattle herds in Zaria. The overall financial losses due to reproductive disorders in 176 cows studied using the farm gate prices were significant especially if the losses are assessed on the entire national cattle population. Out of these losses, the direct losses accounted for 59.2%, while the indirect losses accounted for 40.8%. Brucellosis and milk loss constituted the greatest components of the direct losses while man-hour spent by herd owners was the greatest component of the indirect losses. Vulval lacerations, teat injuries, subclinical and clinical mastitis, calf diarrhea, respiratory infection, dermatitis and coccidiosis also contributed significantly to the indirect losses. The psychological effects due to these disorders as well as the health implication of brucellosis in exposed population could not be computed. It is suggested, that the study be further conducted on a larger scale, both regionally and nationally and that efforts should be made towards the control of reproductive disorders in settled cattle herds in the area and Nigeria in general.

Key words: Losses, reproductive, disorders, cows, settled, herds, Zaria

INTRODUCTION

The economic impact of diseases including reproductive disorders on livestock productivity has been of global significance. The impacts have been estimated in terms of premature deaths of animals, reduced nutritional value of milk to the less attractive taste of meat and from poorer manufacturing characteristics of milk to weaker fibre structure in wool (Morris, 1999). In countries where animals are used for crop preparation and other tasks, disease that render the animals unable to work may also have a severe impact on crop productivity and transport of crops to markets (Morris, 1997). At herd level, diseases commonly reduce fertility and fecundity, thereby impairing herd output and replacement potential. Diseases have also been shown to lower the accuracy with which animals of superior genetic merit can be identified in a herd, thereby reducing the potential rate of genetic gain (Morris, 1999; Radostits *et al*., 1994). Diseases can also reduce the reproductive life both through mortality and premature culling (Morris, 1999) and have caused losses through treatment and control activities, public health risks, impacts on management activities and the allocation of resources (Radostits *et al*., 1994). Several economic models have been used in estimating disease costs including partial analysis (Mukhebi *et al*., 1989), enterprise budget (Rougoor *et al*., 1994), decision tree-analysis (Rodrigues *et al*., 1990; Smith, 1993) optimizing mathematical models (Collins and Morgan, 1991; Jalvingh, 1993), simulation (Van der Kamp *et al*., 1990; Houben and D'leteren, 1995) and cost-benefit analysis (Berentsen *et al*., 1992; Itty *et al*., 1995) and cost-effectiveness (Drummond *et al*., 1987).

Reproductive disorders have been on the increase (Opsomer *et al*., 2000; Lopez-Gatius, 2003; Rajala and Fraser, 2003); many of which have been investigated as possible risk factors for culling (Monti *et al*., 1999). Reducing the impact of uterine infection, (which is a form of reproductive disorder) according to Sheldon and Dobson (2003) is one of the greatest challenges facing the cattle industry at the beginning of the 21st century. Targetting reproductive disorders with preventive programmes in order to reduce forced culling (Milian-Suazo *et al*., 1988, 1989) will minimize economic losses (Beaudeau *et al*., 1995). Knowledge of economic losses associated with reproductive disorders will assist in convincing farmers of the need to employ preventive measures that will reduce the impacts of the disorders as the measures involve economic costs. To the best of the knowledge of the researcher, only few works have been

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reported concerning economic losses associated with reproductive disorders in Nigeria (Ajogi *et al*., 1998). This study, therefore, was conducted to evaluate the economic losses associated with reproductive disorders of cows in settled cattle herds in Zaria. It is hoped that a knowledge base will be established upon which farmers may be convinced on the need to embark on preventive measures against reproductive disorders in order to minimise their losses.

MATERIALS AND METHODS

Study area: This research undertaken in a location called Zaria in Kaduna State of Northern Nigeria. It is located at latitude 11° 08"N, at an altitude of 686 metres above sea level and lies within the guinea savanna zone. Three distinct seasons exist in the area where Zaria is located. They are the harmattan (November to February), hot (March to May) and rainy (June to October) seasons (Ayo *et al*., 1998).

Study herds: Nine settled cattle herds in Zaria and its environs (within the radius of 50 km) were selected with the owners' consent for the study. The selected herds were studied in details with respect to herd characteristics (size and structure as well as management systems (purpose, personnel in charge, housing, feeding, supplementation, watering, breeding, milking practice, weaning, nature of veterinary care and disease prevention, record keeping and restraint), using the combination of a designed questionnaire and interview with the owners as well as physical visits to the herds.

Herd size and structure: The herd sizes ranged from 14-315 (average 79). The structure consisted of cows, heifers, mature bulls, young bulls and calves (females and males) all herded together except in herds 1 and 7 where the calves were separated from their dams and housed in calf pens. The animals were of Bunaji breed in herds 3, 5, 8 and 9; Bunaji and Bunaji× Friesian breeds in herds, 1, 4 and 6 and Bunaji and N'dama breed in herd 2. In herd 1, the cows were subdivided into pregnant and open herds and kept separately. In addition, sheep and goats were also kept in herds 3 and 4; only goats in herd 6 and only sheep in herds 7 and 8.

Study animals: Female cattle in selected herds were subjected to pregnancy diagnosis by rectal palpation or where breeding records existed, the use of breeding dates, to detect those in the third trimester of pregnancy, to constitute the study animals. Animals that were pregnant but were not in the third trimester of pregnancy only joined the study as they entered the last trimester of pregnancy.

Demographic parameters of study animals: Each study animal was properly and adequately identified by ear tag or as identified by the owner. The study animals were provided individualized record sheets provided in log books (hard covered) containing the following information: Age (identified by dentition and/or record), breed, parity (record or history and according to first, second, third parity etc), weight (measured by chest girth tape) and body condition score (Pullan, 1978).

Sample size: One hundred and seventy six study animals (dams) were used for the study. The minimum sample size was estimated on the basis of existing prevalence figures for reproductive disorders in the study.

Visits to herds: Study herds were visited once a week. However, twice-weekly visits were made to postpartum cows during the puerperal period for the purpose of clinical monitoring, observation and obtaining of clinical samples.

Clinical examination of prepartum and postpartum animals and diagnosis of reproductive disorders: Prepartum animals were clinically examined in detail at the first instance when they were identified and all clinical findings on them recorded on their individual record sheets. Subsequently, detailed clinical examinations were only made on them if they were specific needs. Otherwise, clinical observations were made on a general note on all the study animals as the animals were visited. Puerperal (postpartum) cows and their calves were however clinically examined in detail twice weekly during the puerperal period to assess their general health as well as the occurrence of reproductive disorders. Diagnosis of reproductive disorders was clinically done on the basis of clinical signs and/or laboratory analysis.

Economic impact of reproductive disorders: The farm gate prices of animals and their products and the veterinary service charges, cost of veterinary drugs and the cost of man-hour spent by the herd owners were used to compute the estimated losses due to reproductive disorders.

RESULTS

Estimated economic losses associated with reproductive disorders: The estimated economic losses due to all reproductive disorders are presented in Table 1. The direct losses were higher than the indirect losses (59.2 vs.40.8%). Of the direct losses, infection with brucellosis and milk were the greatest components. Man-hours spent was the greatest component of indirect losses, with vulval lacerations, teat injuries, subclinical and clinical mastitis, calf diarrhea, respiratory infections, dermatitis

Table 1: Estimated economic losses due to reproductive disorders in settled cattle herds in Zaria

Category	Source	No. of animals/animal product	Cost of animal/treatment (N)	Total cost(N)
Direct losses	Dam mortality	1	80,000.00	80,000.00
	Calf mortality	9	8,000.00	72,000.00
	Milk loss (mastitis cow)	945 litres (approximated)	150.00 per liter	141,750.00
	Culling			
	Brucellosis affected cows	11	31,250.00	343,750.00
	Congenitally blind calves	7	4,000.00	28,000.00
	Calves with congenital cataracts plus other severe eye defects	12	4,000.00	48,000.00
	Sub-total			713,500.00
Indirect losses	Dam disorders			
	Vulval laceration	29	2,500.00	72,500.00
	Vulval haemorrhage	6	500	3,000.00
	Vulvitis	4	500	2,000.00
	Vaginitis	8	1000	6,000.00
	Clinical mastitis	10	1000	10,000.00
	Subclinical mastitis	35	1000	35,000.00
	Metritis	2	1000	2,000.00
	Retained placenta	5	1000	5,000.00
	Teat injuries	13	1,500	19,500.00
	Udder injuries	2	3,500.00	7,000.00
	Teat enlargement	2	1,000.00	2,000.00
	Sub-total			164,000.00
	Calf disorders			
	Diarrhoea	25	500	25,000.00
	Omphalitis	2	500	1,000.00
	Eye infections	43	500	1,500.00
	Respiratory infections	20	500	10,000.00
	Musculoskeletal problem	1	2.5	2,500.00
	Stomatitis	1	500	500
	Dermatitis	15	1000	15,000.00
	Helminthosis	14	500	7,000.00
	Haemoparasitism	19	500	9,500.00
	Coccidiosis	35	500	17,500.00
	Sub-total			89,500.00
	Man-hour spent by owner	476 cases	238,000.00	238,000.00
	Sub-total			238,000.00
	Grand total			1,205,000.00

Milk loss-based on average of 3 litres per cow for 7 day period of treatment. Loss due to culling-actual price of animal minus culling price of same animal. One US Dollar ($) is equivalent to one hundred and thirty Naira (N)

and coccidiosis also contributing significantly to the indirect losses. The psychological effects due to these diseases as well as the health implication of brucellosis in exposed population could not be computed. The overall economic losses were substantial.

DISCUSSION

The literature is replete with estimates of costs associated with disease on livestock production in different parts of the world (Kaneene and Hurd, 1990; Radostits *et al*., 1994; Morris, 1999) with most of the costs associated with deaths, culling and stillbirths followed by milk loss, drugs, labour and carcass disposal (Morris, 1999) as well as decreased productivity (Otte and Chilonda, 2004). Few studies on the economic losses resulting from individual reproductive disorders have been reported in Nigeria. For instance, Ajogi *et al*. (1998) had estimated economic losses due to brucellosis in two grazing reserves in Nigeria to be substantial. This study has therefore, provided valuable information on the economic losses resulting from a wide range of reproductive disorders in settled cattle herds in the study area.

The estimated economic losses due to reproductive disorders in this study are considered to be substantial, especially if they are extrapolated to the regional and national levels. In this study, neither losses resulting from the psychological effect of reproductive disorders on the herd owners who are intimately attached to their animals nor those accruing from the health implications on the exposed population to brucellosis were computed. These would have added to the overall total losses due to reproductive disorders. The greatest components of the direct losses were accounted for by brucellosis (leading to culling) and milk loss. Brucellosis, a zonoosis (WHO, 1986; Nicoletti, 1993; Maloney and Fraser, 2001), causes heavy economic losses in livestock and poses serious human health hazards world-wide (WHO, 1986; Hamidy and Amin, 2002). Economic losses associated with the

disease include loss of calves, loss of milk, reduced fertility, cost of vaccines and lowered value of animals culled due to the disease. In this study, the losses resulting from the disease were due to forced culling of the affected cows. The annual economic losses due to brucellosis in two grazing reserves reported by Ajogi *et al.* (1998) were substantially higher than the figures obtained in this study. The disparity may be due to the concentration of the animals in the grazing reserves that may have accentuated the effect of the disease in the grazing reserves or the differing prevalence rates of the disease in the different locations. The substantial economic loss associated with brucellosis underscores the need for preventive measures for the disease on a national level. Milk forms a substantial source of income for a great majority of Nigerians especially the nomadic Fulanis. Losses accruing from this source will adversely affect the subsistence economy of this group of Nigerians. A concerted effort directed at reducing the problems of teat injuries, subclinical and clinical mastitis which contributed significantly to the indirect losses as obtained in this study and which can complicate milk losses is therefore necessary. The losses due to man-hours spent by the herd owners in tending to these reproductive disorders are also substantial. If preventive measures are instituted against reproductive disorders, this will certainly cut down on these losses and improve the overall productivity of the livestock in the area.

CONCLUSION

This study has demonstrated the significant economic losses associated with reproductive disorders and hence the necessity for institution of control measures for these disorders in the area with a view of reducing the losses. It is suggested, that the economic losses associated with reproductive disorders be investigated on a larger scale both regionally and nationally.

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