

A retrospective study of production and reproductive conditions in crossbred dairy cows attended at Sokoine University of Agriculture Animal Hospital, Tanzania

A. P. Muhairwa¹, E. Barnabas² and H.E. Nonga¹

¹Department Veterinary Medicine and Public Health, Sokoine University of Agriculture, P.O. Box 3021, Morogoro, Tanzania. ²Department of Veterinary Pathology, Sokoine University of Agriculture, P.O. Box 3018, Morogoro, Tanzania.

Email: hezron@suanet.ac.tz / nongaheszron@yahoo.co.uk

SUMMARY

There have been limited field-based studies on animal diseases in particular production and reproductive diseases in crossbred dairy cows in Tanzania. This work reviews ten years records between 1994 and 2003 to establish the occurrences of production and reproductive diseases/disorders in dairy cows attended at Sokoine University of Agriculture Animal Hospital (SUAAH). During this period 1363 cows were attended and the occurrence of reproductive and production diseases/disorders was at the rate of 22.4% and 21.1%, respectively. Major reproductive disorders recorded were anoestrus (38.5%), retained placenta (29.7%), dystocia (9.8%), abortions (6.8%), metritis (6.1%) and pyometra (4.7%). The recorded production diseases included mastitis (65.9%), milk fever (8.4%), non-mastitis udder diseases (8.0%) and laminitis (7.0%). Occurrences of anoestrus and mastitis were statistically higher compared to other diseases recorded ($P < 0.05$). It is concluded that production diseases and reproductive disorders in particular anoestrus and mastitis are common among dairy cows attended at the SUAAH. Thus, there is a need for extensive epidemiological investigations on the recorded diseases and disorders to better determine the prevalence, predisposing factors, economic impacts and develop strategies for the control at farm level.

Key words: Mastitis, anoestrus, crossbred dairy cows, Morogoro, Tanzania

INTRODUCTION

The potential for increased dairy production in sub-Saharan Africa is substantial. Both mixed- and peri-urban dairy farming potentially complement the smallholder production system that is the most widespread in sub-Saharan Africa. In Tanzania for example, livestock production in particular dairying is an important source of human food, regular household income and employment (Leslie *et al.*, 1999). Reproductive proficiency is one of the core profiles of economic consideration in any livestock production enterprise. Profitable milk production relies upon a

careful, efficient and cost-effective management of dairy herds. However, the productivity of cattle depends largely on their reproductive performance and dairy producers profit most when cows calve first at 2 years of age, calve at approximate 12 to 13 months intervals, and have relatively long herd life (Coleman *et al.*, 1985). Reproductive disorders have been found to be a major reason for decreased reproductive efficiency in cattle (Shiferaw *et al.*, 2005). Infectious and non infectious gynecological disorders can dramatically affect the reproductive efficiency of a cow. Several factors are known to affect production and reproductive performance

of farm animals and it may not be feasible to diagnose satisfactorily reproductive performance by focusing on any one particular disorder or symptom because of the interrelationship of the predisposing factors (Shiferaw *et al.*, 2005). Such factors include managerial, environmental, metabolic and nutritional problems in addition to common reproductive disorders, which collectively interact and exert adverse influences on reproduction. Livestock diseases in particular those which affect reproductive system and production efficiency are reported as among the constraints to dairy industry (Abalti *et al.*, 2006; Mulligan *et al.*, 2006). Indeed, infertility in dairy cattle is widespread in Sub-Saharan Africa and substantially contributes to reduced reproductive efficiency and early culling of cows (Tekelye and Kasali, 1988). For example, under-nutrition contributes to prolonged postpartum anoestrus, and it apparently interacts with genetic, environmental or managemental factors to influence the duration of anoestrus (Montiel and Ahuja, 2005; Patton *et al.*, 2007). Other common reproduction problems in dairy cattle include repeat breeding syndrome, dystocia, abortions, uterine prolapse, foetal membrane (placenta) retention and metritis. For proper management of these problems, studies on the epidemiology are prerequisites.

Importantly, production diseases in particular bovine mastitis is described as one of the major constraints and most costly diseases in dairy production that limit enhanced milk production efficiency in many dairy herds (Hogeveen, 2005). In addition, the cost of mastitis goes beyond the associated milk loss, increased culling rate and treatment costs. Mastitis has also harmful effects on the reproductive efficiency of dairy cows. Preliminary field evidences (Moore *et al.*, 1991) suggested

that clinical mastitis indirectly impairs reproductive performance in dairy cows by altering of inter-estrus intervals and shortening the luteal phase (premature luteolysis). Earlier studies on mastitis in Tanzania reported high prevalence levels and variations among risk factors (Kivaria *et al.*, 2004; Mdegela *et al.*, 2004; Kivaria *et al.*, 2007). Some of these risk factors responsible for the high prevalence have been described including among others poor hygiene, management practices as well as cow factors.

Investigation of bovine reproductive disorders and production diseases based on reported clinical cases provides a great deal of information on the status of such problems out in the field and their incidences. Although it is not an exact reflection of conditions, data from such a study may give the baseline information that merit for more extensive structured epidemiological study. The aim of this study was to evaluate clinical reproductive and production disease conditions and disorders in cows presented at Sokoine University of Agriculture Animal Hospital (SUA AH) between December 1993 and January 2003.

MATERIALS AND METHODS

Study area

The study was done in Morogoro, Tanzania at SUA AH. The hospital provides veterinary services in Morogoro municipality and is a referral veterinary facility countrywide. Morogoro municipal is situated at the latitude 4.49°S and longitude 37.0°E, with an elevation of 500 to 600 m above sea level and is about 200 km west of Dar es Salaam. It has annual average rainfall which ranges between 500 and 1800 mm and ambient temperature of 18°C to 28°C with minimum night temperature of 14°C in May, June and July.

The study area has a bimodal rain pattern, with about 83% of the rain falling between late February and end of May, and short rains between November and January. The dry season constitutes a period from June to October.

Animals and management

All the study animals were crossbred dairy cows of Friesian, Ayrshire, Jersey and indigenous Zebu breeds. Most of the cattle were managed under zero grazing system and a few were under semi extensive grazing system. The cattle were grazed on natural pastures and the lactating cows were supplemented twice (morning and evening) with concentrates compounded from maize or rice bran, cotton or sunflower seed cake and minerals. Under zero management system, the animals were housed in stalls that vary from one farmer to another depending on their income status. The housing system ranged from mud wall, wooden wall or brick wall with thatched or corrugated iron sheet roof. The floor system also varied from mud to concrete. The mating system was mostly natural however; few farmers were using artificial insemination. Hand milking is the only common milking system practiced by farmers in Morogoro municipality.

Data collection

Production diseases in this paper refer to diseases influenced by animal management, especially feeding and breeding of dairy cattle in which production exceeds dietary and thermal input. All clinical cases (irrespective of the diagnosis) of cows recorded at SUAAB from January 1994 to December 2003 were included in the study. Cases for production diseases and reproductive disorders were subsequently sorted and key information

recorded. The recorded information included date the animal was attended at the hospital, patient identification, age, breed, clinical history and conducted clinical examination procedures. Diagnosis of reproductive disorders based on the history obtained from the owner, clinical signs, rectal examination and use of diagnostic instruments like vaginoscope. California Mastitis Test (CMT) and bacterial culture were used to diagnose mastitis in addition to the clinical signs and pathological features presented by the animals. Other productive diseases were diagnosed through history given by owners, clinical signs and pathological features.

Data analysis

The entire raw data were entered in Excel 2003 spreadsheets (Microsoft Corporation, Redmond, Washington, USA), and the frequencies, mean and median computed. Tables and graphics were also generated using Microsoft Excel 2003. The Chi square (χ^2) test was used to assess statistical difference in the proportions tested at $p < 0.05$.

RESULTS

Reproductive disorders

During this period of 10 years a total of 1363 cows were attended and 305 (22.4%) had reproductive disorders. Reproductive disorders included anoestrus 114 cows (37.4%), retained placenta 88 (29%), dystocia 29 (9.5%), abortions 29 (9.5%), metritis 18 (6%), and pyometra 14 (4.6%) (Table 1). Other conditions with low frequencies were uterine prolapse 4 (1.3%), vagina prolapse 2 (0.7%) and vulvovaginitis 2 (0.7%).

Table 1. Percentages of reproductive disorders and production diseases recorded from January 1994 to December 2003.

Reproductive disorder (n= 305)	Number of cases	Percent
Anoestrus	114	37.4
Retained placenta	88	28.9
Abortion	29	9.5
Dystocia	29	9.5
Metritis	18	6.0
Pyometra	14	4.6
Uterine prolapse	4	1.3
Vaginal prolapse	2	0.7
Vulvovaginitis	2	0.7
Vulva edema	1	0.3
Fibrotic cervix	1	0.3
Cervical growth	1	0.3
Prolonged gestation	1	0.3
Total	305	19

Production diseases (n=287)		
Clinical mastitis	189	65.9
Milk fever	24	8.4
Udder disease	23	8.0
Laminitis	20	7.0
Bloat	15	5.2
Downer cow syndrome	8	2.8
Lameness	8	2.7
Total	287	17.9

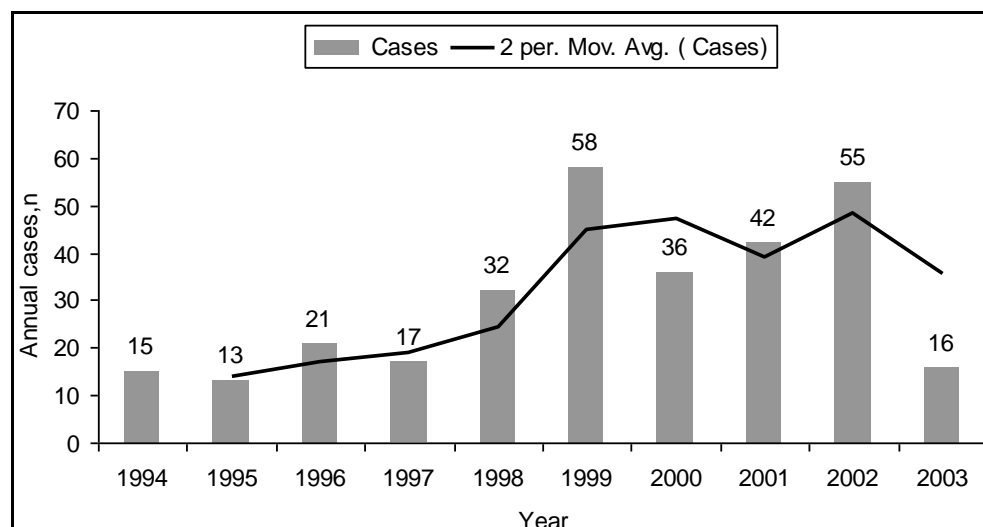


Figure 1. Annual trends of reproductive disorders attended by SUAAB between 1994 and 2003.

Furthermore, one case (0.3%) for each was recorded in the following disorders: delayed parturition, prolonged gestation, cervical growth, fibrotic cervix and vulva edema. The occurrence of anoestrus was statistically higher compared to other reproductive disorders identified ($P < 0.05$). Analysis of annual trend of cases during this period revealed that there was highest number of reproductive cases in 1999 ($n= 58, 19\%$) and 2002 ($n=55, 18.6\%$) and lowest in 1995 (4.3%, $n=13$) (Figure 1).

Production diseases

Of the 1363 cows that were attended 287 (21.1%) had production diseases (Table 1). It was found that mastitis was the leading productive disease as it accounted for 65.9% of all production diseases. Other diseases were milk fever (8.4%), non-mastitis udder diseases like injuries (8.0%), laminitis (7.0%), bloat (5.2%), downer cow syndrome (2.8%) and lameness (2.7%). Analysis of annual trend of production diseases indicates that there was highest number of cases in 1995 and 2000 (13.5%, $n=39$), and lowest in 1998 (5.2%, $n=15$) (Figure 2).

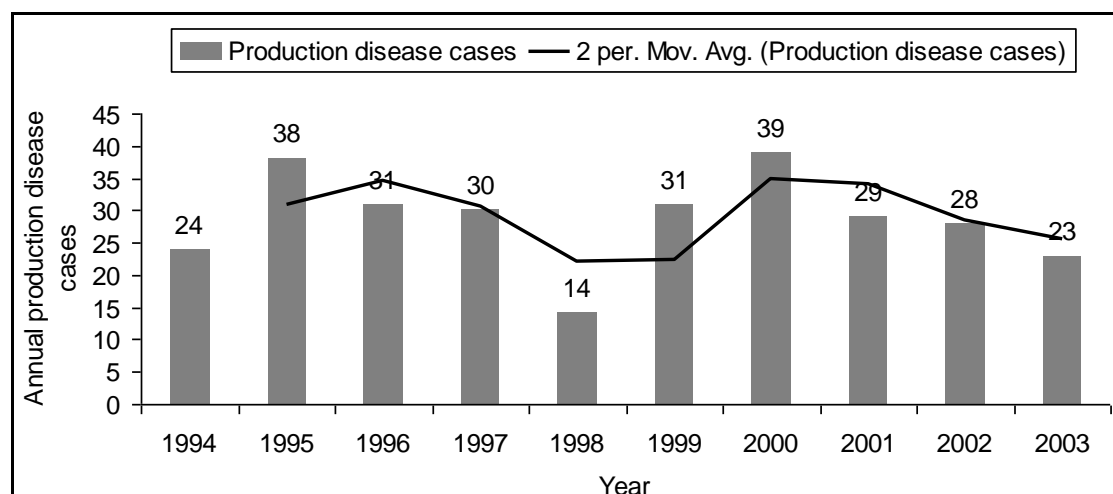


Figure 2. Annual trends of production diseases attended by SUA AH between 1994 and 2003

DISCUSSION

The results of this study provide preliminary data on the status of reproductive disorders and production diseases in dairy cattle attended at SUA AH. Anoestrus and mastitis were the main disease conditions affecting dairy cows in Morogoro municipality. Our results are comparable to the findings by Lema *et al.* (2001) and Shiferaw *et al.* (2005). This implies that the poor reproduction and production performance

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of cattle reared under zero grazing system in Tanzania is to a greater extent contributed by anoestrus and mastitis disease conditions/disorders. This merit for more extensive epidemiological investigations to better determine the prevalence, economic impact and possible control measures of the conditions in cattle.

The proportion of reproductive disorders in this investigation (18.4%) is comparable to findings by Kanuya and colleagues (2000) who reported abnormalities in 18.5% of

dairy cattle in northern Tanzania. Nevertheless, a survey in coastal Tanzania and central highlands of Ethiopia reported a higher prevalence of 50% and 39% respectively (Swai *et al.*, 2005; Shiferaw *et al.*, 2005). In contrast, low reproductive disorders were reported by Waziri *et al.* (2006) in Nigeria and Fathalla *et al.* (2000) in Jordan. This variation could be attributed to the difference in breed, management, geographical locations, environment and level of nutrition. The reproductive disorders recorded at the veterinary clinic reveal the real situation out in the field.

Occurrence of anoestrus (38.5%) is comparable to other studies on same problems in Tanzania. Many other studies have pointed out anoestrus as among the major reproductive disorders responsible for poor reproductive performance of dairy cattle in East Africa (Kanuya *et al.*, 2000; Lyimo *et al.*, 2004; Shiferaw *et al.*, 2005). Several factors are known to contribute to anoestrus condition. Poor body condition caused by poor nutrition and inadequate feeding especially during the dry seasons has positive correlation with anoestrus abnormality in dairy cattle. Studies by Lyimo *et al.* (2004) and Shiferaw *et al.* (2005) reported that poor body conditions compounded with lactation, managerial and environmental stress are the risk factors to anoestrus in dairy cows. In Morogoro, most farmers are unable to provide adequate good nutrition and management to their cows owing to financial constraints and as a result, ovarian dysfunction is further aggravated (Swai *et al.*, 2005). On the other hand, the small herds of cattle are kept as an alternative business, owned by farmers engaged in other income-generating activities not directly related to animal production, who thus spend less time, resources and attention on the management of their farms (Swai *et al.*, 2005).

Retained placenta constituted 28.9% of the reproductive disorder recorded in this study. This finding is comparable to other studies by Swai *et al.* (2005) and Shiferaw *et al.* (2005). Retained placenta is a further potential cause of anoestrus due to increased risk of uterine infections resulting into metritis and pyometra in cows (Bruun *et al.*, 2002). Possible causes of placenta retention are multiple including nutritional and mineral deficiencies, infectious diseases such as brucellosis and genetic makeup of an animal. The current study also observed 9.8% rate of dystocia cases reported at the SUAHA. A study by Swai *et al.* (2005) in coastal Tanzania, dystocia was found to affect up to 50% of births in dairy cows. Normally assisted calvings are likely to result in deleterious effects on subsequent fertility of the cows via postpartum uterine infections (Dohmen *et al.* 2000). Dystocia also increases the likelihood of retained placenta in dairy cows (Schnitzenlehner *et al.*, 1998; Swai *et al.*, 2005).

The rate of abortion cases in the present study (9.5%) was lower than the previously reported by Kanuya *et al.* (2000) in northern Tanzania but higher than that reported by Swai *et al.* (2005) in coastal areas of Tanzania. Elsewhere, studies by Debnath *et al.* (1995); Baxter and Ward (1997) reported higher prevalence of abortions in dairy cows. The recorded rate of abortions in this study was higher than the 5% level that is considered normal (Gaines 1990). The actual cause(s) of abortions in cases used in the present study were not ascertained but several possible causes could be considered like reproductive diseases.

This study recorded also a high occurrence of clinical mastitis (66%) which is comparable to other studies on same problems in Tanzania. The study by Mdegela *et al.* (2005) showed that mastitis

in smallholder dairy herds to be 61%. However, Shem *et al.* (2002) reported mastitis prevalence of 38.3% in zebu and dairy crossbred cows in Morogoro urban and peri-urban areas. Elsewhere in Ethiopia, Almaw *et al.* (2008) reported a prevalence of 34.4% in small dairy farms. While the causes of high prevalence of mastitis in dairy cattle herds are difficult to quantify (Mdegela *et al.*, 2005), genetical, physiological and environmental factors that interact together to alter the defense of the mammary gland are widely accepted to increase susceptibility to mastitis (Sordillo and Streicher, 2002). Generally, the prevailing risk factors that may be responsible for the high occurrence of bovine mastitis in most small dairy farms in Tanzania among others include poor hygiene in animal houses and milking, poor management practices, lack of post milking teat dipping as well as cow factors (stage of lactation, parity and breed) (Shem *et al.*, 2002; Mdegela *et al.*, 2005; Kivaria *et al.*, 2007).

Milk fever, non-mastitis udder diseases and laminitis are also common conditions recorded during this study. Milk fever which occurred at a level of 8.4% lies within the common known average range of 5-10% of the dairy herds (Mulligan *et al.*, 2006). Nevertheless the occurrence of milk fever in backyard dairy herds in Tanzania is of economic importance owing to the small herd sizes that most of farmers keep. Milk fever cases in cow are normally accompanied with dystocia, uterine prolapse, retained placenta, endometritis and consequently may lead to infertility and sometimes death (Mulligan *et al.*, 2006). Non-mastitis diseases of the udder directly impair milk production and predispose animal to mastitis. Laminitis on other hand is among the major causes of lameness in cattle (Mgasa, 1987) and has great impact on the production and

reproduction performance of the lactating cows.

The present study provides a preliminary baseline data for the future monitoring of these potentially important reproductive disorders and production diseases in dairy cows. Through records of clinical cases, it has been found that anoestrus and mastitis are the major problems that affect reproductive and production performance of dairy cattle in Morogoro municipality. However, we recommend that the diseases should be investigated further to determine the prevalence in animals of various age groups and breeds and to develop economic strategies for disease control at farm level. Furthermore, the economic losses due to reproductive and production diseases need to be quantified.

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