REPRODUCTION IN FEMALE CATTLE IN A COMMUNAL FARMING AREA OF ZIMBABWE

N. Honhold¹, F. W. G. Hill², D. C. Knottenbelt³, B. D. Perry⁴ and D. Morton⁵

¹Facultad de Medicina, Universidad Autonoma de Yucata, Apdo Postal 4-116, Merida, Yucatan, Mexico; ²Faculty of Veterinary Science and ³Division of Equine Studies, Department of Veterinary Clinical Science, University of Liverpool, Leahurst, Neston, Wirral, Merseyside, England; ⁴ILRAD, PO Box 30709, Nairobi, Kenya

SUMMARY

Cattle in a communal farming area of Zimbabwe were identified and examined in the late dry and mid wet season of 1985/86. Ovarian activity rates were 17.9% and 38.6% in the dry and wet season respectively. Pregnancy rates were 16.1% and 24.6% respectively. A major limitation to reproduction was the percentage of anoestrous females. There was no evidence of a seasonal calving pattern. Median body condition score was 2.0 in the dry season and 1.5 in the wet season. Adult females of body condition score 2.5 and above had ovarian activity rates of 41.9% and pregnancy rates of 41.9 per cent. Those with a body condition score below 2.5 had rates of 26.8% and 16.4% respectively. Serum progesterone levels in pregnant animals were positively related to body condition score, with some animals having progesterone levels similar to non-pregnant animals. Metabolic profiles suggested that the major limiting nutrient in both seasons was nitrogen, although other micronutrients might also be involved in low reproductive rates.

INTRODUCTION

Reproductive rates of cattle in the Communal Farming Areas (CFAs) of Zimbabwe are said to be low, with annual calving rates being estimated at 40 to 52% in two questionnaire surveys (Gubbins and Prankherd, 1983; GFA, 1987). This is less than the 44 to 88% found in a questionnaire survey in Zambia (Perry et al., 1984) but similar to the 36 to 50% calving rate reported in Botswana (Reed et al., 1974) in a survey that combined questionnaire techniques with rectal pregnancy diagnosis, and to the 27.9% reported from Zambia in a survey in which calving rate was recorded by monthly monitoring of herds (Nadaraja et al., 1984).

The major constraint on reproduction of CFA cattle in Zimbabwe is thought to be low fertility due to poor nutrition, mainly caused by high stocking densities. This inference has been drawn from the evident overgrazing in the CFAs (Whitlow, 1980) and response to nutritional supplements on conception rates under on-station conditions (Oliver and Richardson, 1976).

Using metabolic profiles, body condition scoring, rectal pregnancy diagnosis and serum progesterone levels, observations have been made on cattle in a CFA in Zimbabwe in an attempt to confirm and expand these findings on reproductive rates and constraints to fertility.

MATERIALS AND METHODS

Chinamora CFA is located approximately 20 km north of Harare in the highveld of Zimbabwe. It lies in an area in which rainfall of between 750 and 1,000 mm per year occurs during one season from November to April with good reliability, and is suitable for both cropping and livestock. Rainfall over the period of this study (August 1985 to February 1986) was within the expected range. The stocking rate was
estimated from census figures (Zimbabwe Veterinary Services, 1986) to be 0.37 livestock units per hectare (Williamson and Payne, 1978) with cattle representing 98% of this. The average number of cattle per kraal in Chinamora CFA is 8.7, ranging from 2 to 25 (Bryant and Norval, 1984). Cattle are generally kraaled at night. Grazing is limited to non-arable land during the growing, wet season, with access to cropping land and its residues only after the harvest is complete. As the name implies, land tenure is communal.

All study cattle were Sanga type (a stabilised Bos taurus and Bos indicus cross) or their crosses with Bos taurus breeds including Sussex, Holstein and Simmental. Volunteer farmers at 7 dip tanks were identified in August 1985 and all their adult animals were eartagged and used in the study. Animals at 6 dips were sampled twice as described below, once in October/November 1985 at the end of the dry season and again in February/March 1986 during the rainy season. One dip was visited only once, in the dry season. In the dry and wet seasons respectively, 110 and 76 female animals were examined per rectum. Due to lower presentation rates at the second sampling and the loss of eartags it was only possible to pair data for the 2 visits for 57 female animals. Where results are shown comparing dry and wet season values only data from these animals have been included.

On each sampling visit the following procedures were undertaken. Body condition score (BCS) was measured for each animal using the 5 point system (ADAS, 1978) and scoring in 0.25 steps. Venous blood was taken from either the coccygeal or the jugular vein depending on handling facilities. Samples were collected into Vacutainer tubes (Becton Dickinson) containing either no anti-coagulant, EDTA, or lithium fluoride. A peripheral blood smear was made from puncture of the tail tip, with fixation in methanol being carried out immediately after air drying of the slide. Adult females were examined rectally for evidence of pregnancy and also for the presence of a corpus luteum (CL) on either ovary. If a conceptus, CL or signs of active oestrus were recorded the cow was recorded as showing evidence of ovarian activity.

Blood samples were subjected to various procedures depending on the type of sample. Clotted samples had the serum separated and this was used to measure total protein, albumin, beta-hydroxybutyrate (BHB) and urea. Plasma from the lithium fluoride samples was used to measure glucose and inorganic phosphate levels. All biochemical assays were performed using an autoanalyser (Gemini Miniature Centrifugal Autoanalyser, Electronucleonics Inc.) and standard kits (Virgo-clinical, Electronucleonics Inc.).

Haemoglobin (Hb) was measured using the EDTA sample. For the first sampling, this was done using the cyanmethaemoglobin method using a spectrophotometer for Hb. For the second sampling, the haemoglobinometer of a Coulter-ZM (Coulter Electronics Ltd) was used. All blood smears were stained with Giemsa stain and examined for the presence of the blood parasites. Serum from each blood sample was stored at −20°C within 24 hours of sampling. In January 1988, samples from 84 adult female animals were thawed and subjected to radio-immunoassay to determine progesterone levels (Amerlex-M Progesterone RIA, Amersham International PLC).

Results were recorded and analysed with a computer database and statistics package (PANACEA, Veterinary Epidemiology and Economics Research Unit, University of Reading). All Chi-squared tests were for 2 × 2 tables and were performed using the exact test of homogeneity.

RESULTS

Of females examined twice, a CL was present in 17.9% (n = 56) in the dry season