

Reproductive efficiency of exotic dairy cattle under tropical conditions

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RÉSUMÉ

Performance de reproduction de bovins laitiers exotiques en milieu tropical

Les données de reproduction sur cinq ans ont été relevées chez des troupeaux de races Holstein et Brune Allemandes à la ferme de l'Université d'Ibadan. L'âge moyen au premier vêlage était de $34,91 \pm 4,31$ mois, l'intervalle moyen de vêlage de 506,8 jours, la production moyenne de 2,6 veaux par vache et le taux moyen de vêlages de 55,5 p. 100. La performance de reproduction des troupeaux était probablement influencée par les problèmes soulevés par les conditions pathologiques, du milieu et nutritionnelles, ces dernières étant dues aux variations saisonnières du fourrage disponible.

Mots clés : Reproduction — Bovins laitiers — Holstein — Brune allemande — Nigéria.

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Summary. — The reproductive data for a period of five years in German Brown and German Holstein herds, at Ibadan University Farm, showed that the average age at first calving was 34.91 ± 4.31 months, average calving interval (C.I.) was 506.8 days, average calf crop was 2.6 calves per cow and the average calving rate was 55.5 p. 100. The reproductive efficiency of the herds under study was probably affected by reproductive problems arising from nutritional, environmental and pathological conditions. The nutritional problems might have arisen from seasonal variation in nutrient supply.

Key words : Reproduction — Dairy cattle — Holstein — German Brown — Nigeria.

KNUDSEN and SOHAEL (7) reported that the age at 1st calving of imported Friesian (German Holstein) and Vom bred Friesian cattle maintained at the Livestock Improvement Centre of the Nigerian Institute of Veterinary Research (formerly called Federal Department of Veterinary Research) averaged 28.8 and 28.2 months, with a mean age at 1st

service of 19.5 months and average calving intervals of 367 and 369 days respectively.

MCINTRE (9) kept two herds of Friesians and Jerseys for 16 years under conditions of good management at Koronivia Research station in Fiji Island and he discovered that both had an average age at 1st calving of 36.8 months and calving intervals of 424 and

423 days for Friesian and Jersey cows respectively.

This investigation deals with the reproductive performance of semi-intensively managed German Brown (Brown Swiss) and German Holstein (Friesian) herds in Ibadan, Nigeria. The objective of this investigation was to check whether there was a change in the reproductive performance of these animals under a different climate and management.

MATERIALS AND METHODS

This is a data analysis covering the space of 1970 and 1975 of a German Brown and Holstein (Friesian) herds managed on a semi-intensive system at the University of Ibadan Teaching and Research Farm.

The herds were made up of the German breeds — the Holstein (Friesian) and Brown cows. They were all imported from the Federal Republic of Germany for the improvement of milk and beef production in the Oyo State of Nigeria. The animals were bred by artificial insemination and herd mating. The ages of pregnancy of the animals at importation varied from 1-7 months.

The records of 53 animals were analysed using the production records at the University Dairy Unit.

The production records were used to determine the following parameters :

1. Age at first calving (in months). This was classified in ranges of 4 starting from 20 months to 70 months of age.

2. Calving interval (days between two calvings). It was classified as incidence of calving intervals in ranges of 50 starting from 201 days to 1 200 days. The incidence of calving intervals was further classified into groups :

- Group 1 from 201 days to 300 days ;
- Group II from 301 days to 500 days ;
- Group III from 501 days to 800 days ; and
- Group IV from 801 days to 1 200 days.

TABLE N°I—Ranges of age at 1st calving

| Range of 4 ages at 1st Calving (months) | N° of Animals in each range | Percentage of Animals |
|---|-----------------------------|-----------------------|
| 20 - 25 | 5 | 9.43 |
| 26 - 30 | 12 | 22.43 |
| 31 - 35 | 20 | 37.74 |
| 36 - 40 | 4 | 7.55 |
| 41 - 45 | 5 | 9.43 |
| 46 - 50 | 4 | 7.55 |
| 51 - 55 | 0 | 0 |
| 56 - 60 | 1 | 1.87 |
| 61 - 65 | 1 | 1.87 |
| 66 - 70 | 1 | 1.87 |

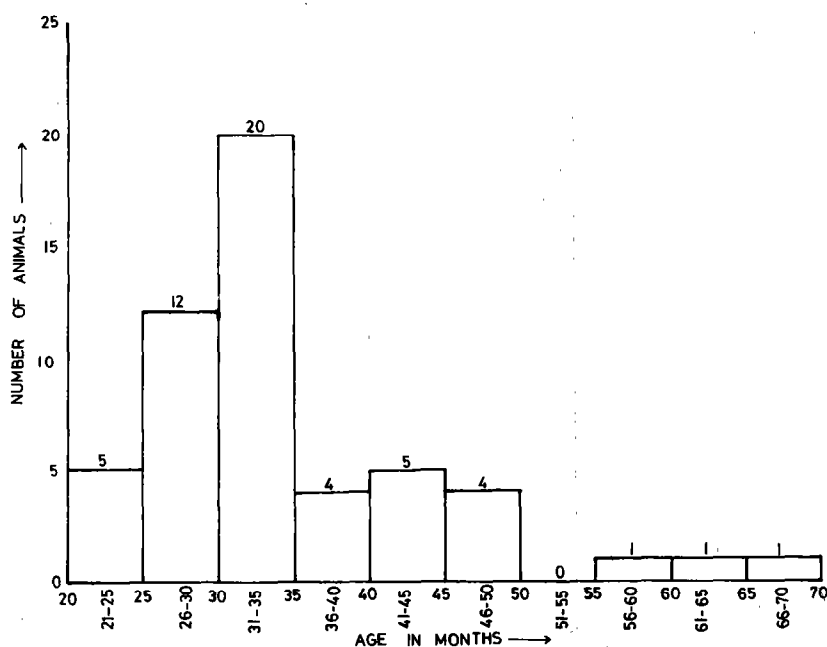


Figure 1. — Range of age at 1st Calving.

TABLE N°II-Ranges of Incidence of Calving interval in days

| Range of calving interval (days) | GROUP I | | | | | GROUP II | | | | | GROUP III | | | | | GROUP IV | | | | |
|--|---------|---------|---------|---------|---------|----------|---------|---------|---------|---------|-----------|---------|---------|---------|---------|----------|-----------|-----------|-----------|-----------|
| | 201-250 | 251-300 | 301-350 | 351-400 | 401-450 | 451-500 | 501-550 | 551-600 | 601-650 | 651-700 | 701-750 | 751-800 | 801-850 | 851-900 | 901-950 | 951-1000 | 1001-1050 | 1051-1100 | 1101-1150 | 1151-1200 |
| Incidence of each range in the herd over the whole date period | 1 | 2 | 8 | 15 | 12 | 7 | 4 | 12 | 5 | 3 | 2 | - | 5 | 1 | - | 1 | - | 1 | - | 1 |
| Percentage of Animals | 1.25 | 2.50 | 10 | 18.75 | 15.00 | 8.75 | 5.00 | 15.00 | 6.25 | 3.75 | 2.50 | - | 6.25 | 1.25 | - | 1.25 | - | 1.25 | - | 1.25 |

3. Calf Crop (number of calves produced by each animal). It was classified starting from 0 to 5 calves.

Records of abortions, stillbirths, placental retention and of pathological conditions such as endometritis, vulvovaginitis were also considered.

The average age at first calving for the whole herd was 34.92 ± 4.31 months (mean \pm S.D.). 17 of the animals (32.08 p. 100) were above the average while 36 animals (67.92 p. 100) were below the average age at first calving. 77.36 p. 100 of the animals were within the range of 41 to 50 months and 5.61 p. 100 in the range of 51 to 70 months at first calving (Table 1, Fig. 1).

About 13.75 p. 100 of the calving intervals were in group 1, 47.5 p. 100 in group II, 33.75 p. 100 in group III and 5 p. 100 in group

IV (Table II). The average calving interval for the whole herd was 506.8 days for a total of 81 calving intervals calculated from calving of the 53 animals. Only 13.75 p. 100 of the total incidence of calving intervals were 350 days and below while 86.25 were over 350 days (Fig. II). 41.98 p. 100 of the total number of calving intervals were above the average calving interval of 506.8 days while 58.02 p. 100 of the calving intervals were below.

6 animals (11.32 p. 100) had one calf each, 21 animals (39.62 p. 100) had two calves each, 17 animals (32.08 p. 100) had three calves each, 8 animals (15.09 p. 100) had four calves each while only one animal (1.88 p. 100) had five calves within 5 years (Table III).

The highest calving rate was 100 p. 100 recorded in 1973 while the lowest was 5.8 p. 100 in 1972 (Table IV). In 1973, 1974, and

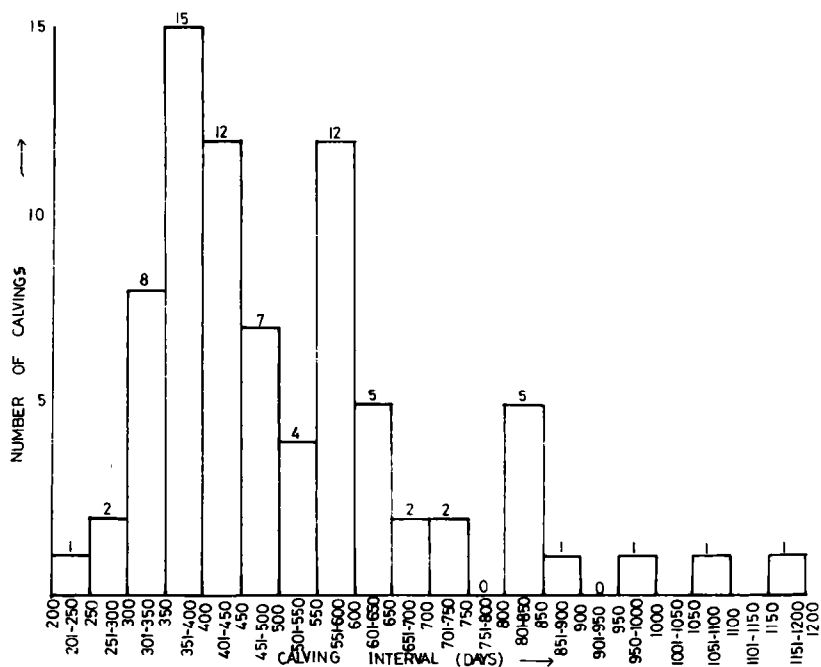


Figure 2. — Distribution of Calving intervals in German Cattle in Ibadan, Nigeria.

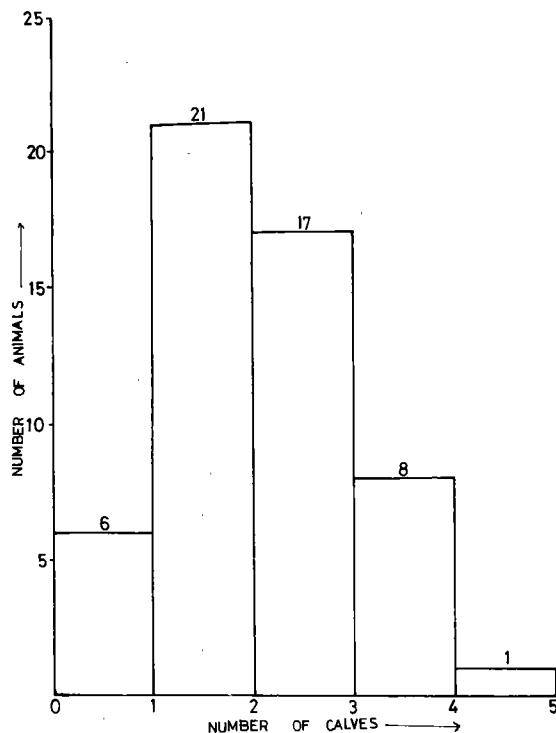


Figure 3. — Range of « Calf Crop. »

1975 8, 4 and 7 cows had retained placenta respectively. 16 abortions and 11 still-births in the herd were recorded within the five years of study.

TABLE N°III-Calf Crop

| Number of Calf Crop | N° of Animals in each Calf Crop | Percentage of Animals |
|---------------------|---------------------------------|-----------------------|
| 0 | 0 | 0 |
| 1 | 6 | 11.32 |
| 1 | 21 | 39.62 |
| 3 | 17 | 32.08 |
| 4 | 8 | 15.09 |
| 5 | 1 | 1.89 |

TABLE N°IV-Calf Crop per year

| Year | N° of cows in heard | N° of calves produced | Calving rate percentage |
|------|---------------------|-----------------------|-------------------------|
| 1971 | 29 | 18 | 62.1 |
| 1972 | 52 | 3 | 5.8 |
| 1973 | 52 | 52 | 100 |
| 1974 | 49 | 25 | 51 |
| 1975 | 46 | 27 | 58.7 |

DISCUSSION

The average age at 1st calving in this work was 34.92 ± 4.31 months. KNUDSEN and SOHAEL (7) reported a mean age at 1st calving in Vom (Plateau State of Nigeria) of 28.2 months while MCINTRE (9) reported an average age at 1st calving of 36.8 months in the Fiji Island. The age at 1st calving of purebred Friesians imported or locally born in Vom compared favourably with that in temperate climate and may be considered a good indication of the adaptability of the Friesians to the Vom environment with a micro climate simulating that of the temperate areas (7).

In the temperate climate the Friesians normally calve at about 28 months of age (5). The age at 1st calving observed in this study was significantly higher ($P < .001$). The average age at 1st calving at Ibadan University farm which was longer than that in the temperate climate may be due to the tropical climate of Ibadan characterised by high environmental temperatures and humidities and these had been shown to affect conception rates (5); early divisions of fertilised ovum (11); estrus, ovulation and implantation (2, 3, 4, 8, 10). High temperatures and humidities have also been shown to produce a deterioration in semen quality in bulls, lower fertilisation rates, and embryonic mortalities (6, 12).

The average calving interval for the herd was 506.8 days compared to 365 days in the temperate areas, and 368 days in the Vom investigation and 424 days in the Fiji Island experiment. This may be explained by the fact that some of these animals have suffered from infectious reproductive problems, like retained placenta, endometritis, vulvovaginitis and some other diseased conditions like foot and mouth disease, heartwater disease, streptothricosis, foot rot, mastitis and helminthiasis. These conditions have been shown to affect the reproductive performance of cows (1).

16 of the cows in the herd had abortion and some of these abortions might be due to the outbreak of foot and mouth disease in the Ibadan University exotic dairy unit in 1973 but the effect of brucellosis, trichomoniasis and campylobacteriosis could not be ruled out as these had not been properly investigated.

TABLE N°V-Table of Summaries

| Parameter | Range of values | Average for Herd | Percentage of Animals above Average | Percentage of Animals below Average |
|--------------------------------|-----------------|------------------|-------------------------------------|-------------------------------------|
| 1. Age at 1st calving (months) | 22-66 | 34.92 | 32.08 | 67.92 |
| 2. Calving interval (days) | 204-1160 | 506.8 | 41.98 | 58.02 |
| 3. Calf Crop (calves) | 1-5 | 2.6 | 49.06 | 50.94 |
| 4. Calving rate (Percentage) | 5.8-100 | 55.5 | - | - |

The effect of nutrition on the reproductive performance of dairy cows should also be considered. There is seasonal variation in the amount of pasture available to these animals and this might affect the estrus, ovulation and implantation in these cows.

The number of abortions in the herd may be responsible for the 50.94 p. 100 of animals with a calf crop below the average of 2.6. The

lowest calving rate of 5.8 p. 100 in 1972 may be attributed to embryonic deaths.

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Resumen. — Se han notado los datos de reproducción durante cinco años en rebaños de raza Holstein y Parda alemán en la finca de la Universidad de Ibadan. Era de $34,91 \pm 4,31$ meses la edad media al primer parto, de 506,8 días el intervalo medio de parto, de 2,6 terneros por vaca la producción media, de 55,5 p. 100 el termino medio de los partos. Los problemas causados por las condiciones patológicas, del medio, y nutricionales influyen probablemente la eficacia de reproducción de los rebaños. La alimentación dependía de las variaciones estacionales del pasto disponible.

Palabras claves: Reproducción — Bovinos lecheros — Holstein — Pardo alemán — Nigeria.

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