

CONDITION SCORE OF HOLSTEIN COWS AND ITS' RELATION
TO PRODUCTION AND FERTILITY
IN THE HUMID TROPICS

T Lasso G, F Meléndez N and J Scoffield

Colegio Superior de Agricultura Tropical, Apdo. Postal No. 24, H. Cárdenas, Tabasco, México.

One hundred and fifty six cows were classified for condition score on a scale from 1 to 6 (very thin to very fat respectively) according to their physical condition at parturition. The characters, total and daily milk production, length of lactation, intervals between parturition and first service and between parturition and conception were analysed in a completely randomized design for differences attributable to condition score. No significant differences were found between condition scores and the variables studied. There were positive linear regressions between condition score at birth and total and daily milk production. In general, condition scores 5 and 6 were superior for milk production, but for reproductive performance the most efficient cows were those with condition scores 3 and 4. Further study is required of the relationship between condition and reproductive performance.

Key words: Holstein cattle, condition score, milk production, fertility.

In the tropics, climatic conditions and current levels of management and feeding of cattle result in low milk production and poor reproduction performance especially in the dairy breeds of European origin (Bodisco et al, 1969 ; Anon 1973 ; Ramos 1978).

Moreover, in the less developed areas of the world, and especially in the tropics, the expensive and sophisticated infrastructure characteristic of milk production in the temperate zones is often lacking. As a result it is often necessary to simplify animal management. During recent years some researchers (Collard, 1977; McCarthy, 1978; Frood and Croxton, 1978) have been investigating a simple classification technique for dairy cows based on a visual estimation of body reserves present as fatty tissue in the lumbar and tail base areas. The estimates of body reserves are classified according to a condition score which has been related to milk production and fertility. Although as yet there have been few studies, producers and technicians have been sufficiently encouraged to utilise the technique due to its ease and speed of use in comparison with alternative techniques, eg. chest bands or weighing scales.

In view of the above, a study was carried out with the objective of testing, within a population of dairy cows, the relationships between condition score and milk production and the principal measures of reproductive efficiency.

Materials and Methods

Site: The study was carried out in the dairy units of the collective farms C-14, C-21 and C-22 of the Chontalpa Plan, Tabasco State, Mexico. The region has a wet tropical climate (Garcia, 1973) with a mean annual

rainfall of 2,204 mm. and a mean annual temperature of 26.2°C.

Animals and Management: A total of 156 registered Holstein cows with 2 or 3 previous lactations and calving between August to December 1978 were used in this study.

The cows grazed Star grass pastures (*Cynodon plectostachyus*) for about 14 hours daily, mainly during the night. In addition the cows received 2 to 3 kg. of a concentrate (16-18% CP) and 3 kg. of molasses/urea (2.5% urea) which were fed during the day while the cows were housed. The cows were machine-milked twice daily.

Treatments and design: The cows were classified according to their condition using a scale from 1 to 6 similar to that proposed by Collard (1977). The adipose tissue at the tail base was the main area used in the scoring with the lumbar area used as an aid. Each condition score was defined as follows:

- Condition 1 :* The base of the tail is hollow and the six points of the coccyx have no flesh covering. The sacrociatic ligaments can be seen.
- Condition 2 :* The base of the tail is hollow and the four points of the coccyx have no flesh covering but the two laterals have a little.
- Condition 3 :* The base of the tail is still hollow and the four points of the coccyx have no flesh covering.
- Condition 4 :* The base of the tail is less hollow than in condition 3 and the four points of the coccyx have a little fat covering.
- Condition 5 :* The base of the tail is almost filled by fatty tissue and the spinous processes are not felt.
- Condition 6 :* The base of the tail is completely filled by fatty tissue as are the hipbones and spine. The cow has a rounded appearance like a steer.

Daily and total milk production was estimated for all cows from monthly weighings. Length of lactation was also recorded as were the main measures of reproduction efficiency, the intervals between calving and first service and calving and conception.

Condition score at calving was considered as the treatment, giving a total of six classes (1 to 6) with unequal numbers of observations. Linear and quadratic regressions and correlations were calculated between condition score at calving and all the productive and reproductive variables given above.

Results and Discussion

There were no statistically significant differences between condition scores for the different variables studied (Table 1). This lack of significance may be attributable to an insufficient number of observations particularly in the extreme condition scores (1 and 6) which had only 6 and 4 cows respectively while the other scores had between 14 to 45 observations each. High coefficients of variation were found for all variables except length of lactation.

Table 1:

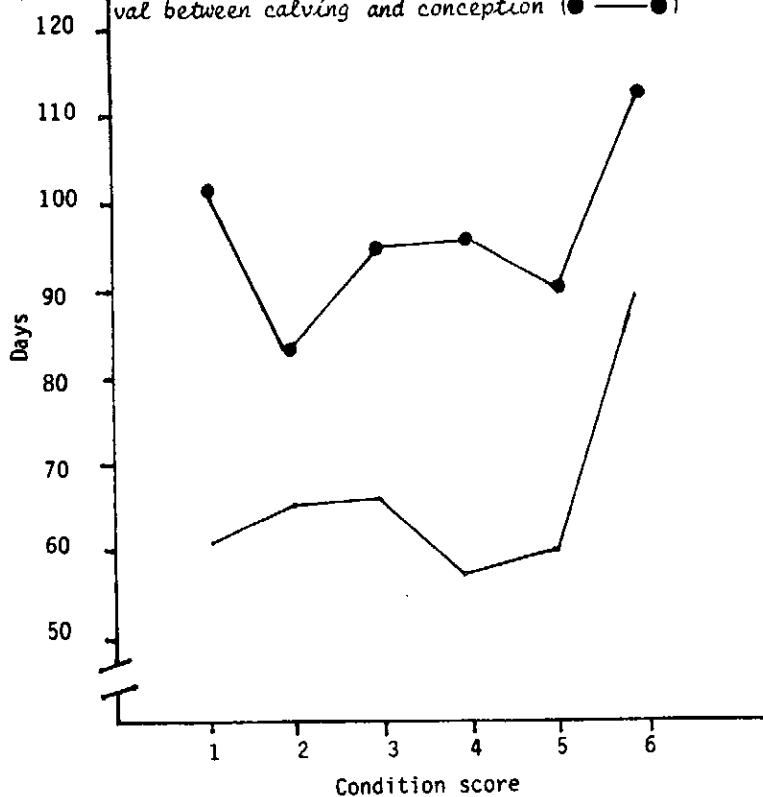
F values and levels of significance for the analysis of variance for condition score at calving

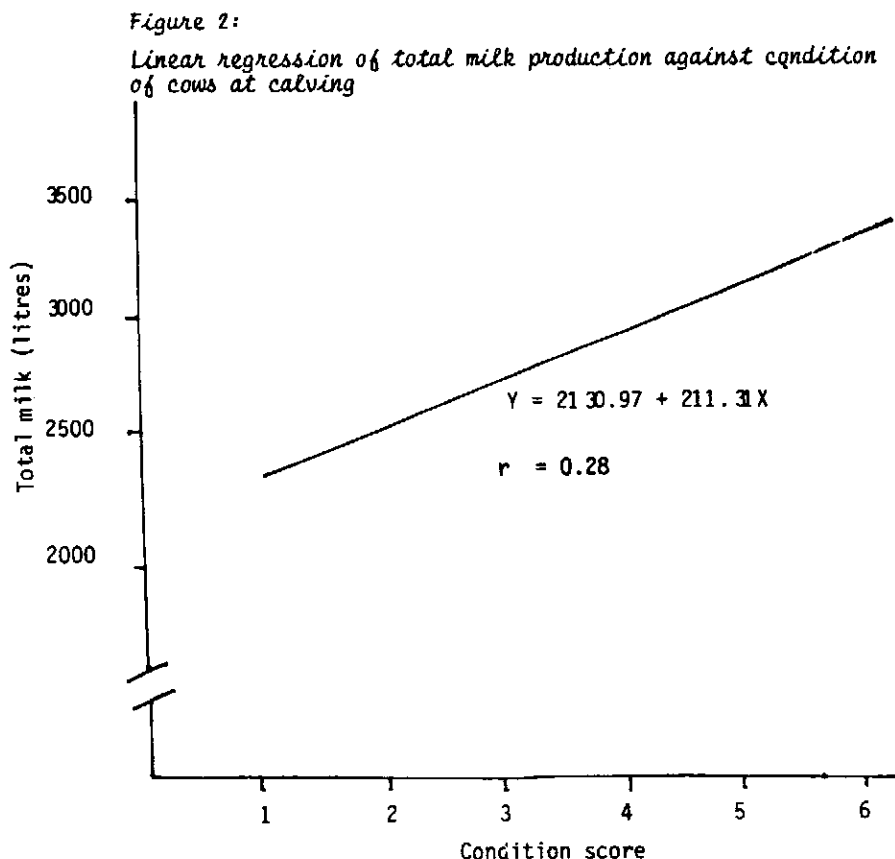
Source of variation	Number of observations	F value	Sig.	P	CV %
Total milk production	119	1.229	n.s	0.299	40.6
Length of lactation	119	0.979	n.s	0.434	13.4
Daily milk production	123	1.033	n.s	0.401	33.4
Interval between calving and conception	127	0.665	n.s	0.651	40.1

Notwithstanding the lack of significance, the average values for fertility showed clearly defined tendencies (Figure 1) with a positive linear and quadratic relationship between daily and total milk production and the condition score of the cows at calving. (Figure 2).

Figure 1:

Fertility in relation to condition of cows at calving.
Interval between calving and 1st service (—), interval between calving and conception (●—●)





For the variables, length in days from calving to first service and from calving to conception the poorest reproductive performance was shown by the cows whose condition at calving was 6, with the longest intervals (89.2 and 114 days respectively). This effect could be attributed to two causes, firstly the negative effect of the accumulation of fat in the reproductive organs. Arnett et al (1971) have observed that cows considered obese and that had a liveweight 37% above the average, needed 19% more services per conception than cows of average weight. The second cause may be related to milk production. Boyd et al (1954) state that cows with high milk yields present reproductive problems, although low correlation coefficients have been found between these variables (Matsoukas and Fairchild 1975; Nemadovic and Gaurilovic 1976; Olds et al 1979).

However it was also noted that cows of condition score 1 which had a shorter interval between calving and first service (61.5 days) were not the most fertile since their interval from calving to conception was 101 days.

The effect of milk production on fertility is presented in figure 1 which shows the apparent antagonism between these variables in cows of condition score 6. These cows tended to be better milk producers (3,387 litres/lact.) and at the same time the latest to first service.

The best performance was that shown by cows of condition score 2, which were intermediate to first service and the first to conceive. Next were cows of condition score 3.

These results show that for milk production high condition scores are preferable but for reproductive efficiency cows with low scores are more efficient. Therefore it could be inferred that the best milk yield and reproductive performance will be achieved by cows whose condition at calving is intermediate on this scale of scores.

The degree of correlation between condition score at calving and the different variables studied was not very different and in general the correlations were low, which results may be influenced by the number of observations and the variability between observations within each condition score.

Cow condition at calving was adjusted using linear and quadratic regression equations (Figure 2). This same linear distribution in milk production data has been reported by Froot and Croxton (1978), however in our study the correlation was 0.28 which, despite being highly significant ($P < 0.01$) suggests the interaction of multiple factors as in fact happens in milk production.

In general the calving to first service and to conception intervals for the different condition scores were excellent (De Alba, 1964) with average values of 66.8 and 96.5 days respectively. However regressions between these variables and condition scores were not significant.

The reproductive performance in this study is better than that reported for the same breed in a temperate climate by Bueno (1971) who analysed 4536 intervals between calving and first service from 2,000 cows with a mean of 99.3 days, which is similar to that reported by Salazar et al (1970) for the Holstein breed maintained in 3 different environments in Colombia.

The outstanding reproductive performance of the cows reported here can be attributed in the main to the level of feeding and management which all the cows received in the herds under study. A good energy level was provided by the grass and the molasses in the diet which contributes to the improvement of the ovarian functions of the cows (King, 1968; Laing, 1970; Sonderegger and Schurch, 1977; Yazman et al 1979).

When the calving to first service and calving to conception intervals are compared (Figure 1), it can be seen that the best performance was achieved by the cows whose condition at calving was 2 and 3 following in descending order by those in 4, 1 and 6. It is important to point out that the cows which were served most quickly were the group with condition score 4. However these were not the first to conceive which agrees with the observations of Whitmore et al (1974) which suggest that early services are detrimental to fertility (Rodriguez et al 1975) as happened in the present study.

It is concluded that for milk production in general condition scores 5 and 6 are preferable; However for reproduction cows with condition scores 3 and 4 will be more efficient. It is suggested that future studies include a greater number of cows and that lactations are adjusted (for days and number) to reduce the variability in the data.

Finally it is necessary to test this technique on dairy cattle typical of the zone because often Holstein is not the most frequent breed and there may exist variation in the applicability of the scale proposed in this study when used for other genotypes.

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