USE OF THE STANDARD COW TECHNIQUE AS AN AID TO PROBLEM DEFINITION IN ON-FARM EVALUATIONS OF FEEDING PROGRAMMES

G.K. REASON*, P.N. THURBON* and W.N. ORR**

SUMMARY

The evaluation of pasture based feeding systems which influence dairy cow production at various stages of lactation is a continuing process which provides herd management information to farmers and research workers. This paper describes a technique for evaluation of farm feeding systems based on a "standard" or expected lactation curve.

Two basic feed systems - dryland and irrigated - have been investigated using this technique.

INTRODUCTION

The shape of the lactation cuwe Of dairy cows has been the subject of many investigati ons (Johanssen 1961; wood 1976). This information has been used to predict overall herd milk produc tion performance and therefore serve as a management aid in regulating farm output. In Britain, several computer based systems are available for projecting herd production (Esslemont 1980, "Supercow" 1981). Some of these systems allow for prediction of individual cow yields (necessary for the farm yield prediction) and a comparison of actual and predicted yields on an individual cow basis. These predictions are all based on the 1actation curve model as proposed by Wood (1967, 1 968, 1969, 1970, 1976).

The evaluation of dairy farm feed production and utilization systems is important to both research workers involved in on-farm investigations and to dairy farmers in assessing those factors which appear to be constraints to increased production.

This paper provides some results based on a method of assessment of on-farm feed production and utilization systems using the shape of the lactation curve.

MATERIALS AND METHODS

A study based on 42 herds in three Queensland dairying regions (i.e. Moreton, Darling Downs and Central Queensland) was undertaken. The data available from the production recording scheme operated by the Queensland Department of Primary Industries included individual cow milk production, stage of lactation, number of cows, and calving dates. Cow milk production was recorded on a monthly basis with the stage of lactation recorded as days from calving date to date of production recording.

The study was carried out using data on milk production from January 1982 to February 1983 inclusive. In all, 2949 cow lactations were used. The average production for all cows was 3285 litres. Two farming systems were investigated - irrigated farms with more than 0.1 ha of irrigation per cow, and dryland farms.

*D.P.I., G.P.O. Box 46, Brisbane, Qld 4001.
**D.P.I., P.O. Box 27, Kairi Research Station, Kairi, Qld 4872.

Feed Production System	No. of Farms	No. of Cows	Average Production/Cow
Dryland	20	1337	2783
Irrigated	22	1612	3701
Total	42	2949	3285

The number of cows in each of 10 stage of lactation sub-classes were calculated for each herd for each month. Using correction factors derived from lactation curves, the number of "fresh" or "standard" cow equivalents per month was calculated for each herd. These correction factors were based on a lactation curve which rises to a peak production at 30 - 45 days post partum and then declines at a rate of 10% per month.

The complete list of factors used is shown in Table 1.

TABLE 1 Standard cow correction factors

Stage of Lactation (Days)	Average Production as a % of Peak Rate
1 - 15	83.3%
16 - 45	100.0%
46 - 75	90.0
76 -105	81.0
106 -135	72.9
136 -165	65.6
166 -195	59.0
196 -225	53.1
226 -255	47.8
256 -285	43.0

RESULTS

The mean production per standard cow by months for each farming system is given in Table 2.

TABLE 2 Mean production per standard cow by months for irrigated (22 farms) and dryland (20 farms) systems

MONTH	IRRIGATED Mean Standard Cow Milk (L)	S.D.	DRYLAND Mean Standard Cow Milk (L)	S.D.
January 1982	20.73	5.24	16.28	3.41
February 1982	19.41	4.78	15.93	3.19
March 1982	18.52	4.42	15.39	3.17
April 1982	18.15	4.19	14.80	2.94
May 1982	17.99	4.23	13.91	3.33
June 1982	18.23	4.31	14.17	3.41
July 1982	19.11	4.87	13.69	3.34
August 1982	21.48	5.78	13.21	2.99
September 1982	22.72	4.85	13.42	2.98
October 1982	22.16	4.96	15.13	3.40
November 1982	22.19	4.87	15.46	3.79
December 1982	22.04	4.98	16.00	4.61
January 1983	23.13	4.96	17.52	4.49
February 1983	22.26	5.01	15.89	3.51

These results show that in irrigated farming systems, peak milk production per cow occurs in January, and production declines to a low in May and then increases to a plateau from August - December. In dryland farming systems, peak production again occurred in January, but the decline in production continued through late summer, autumn and winter until August.

DISCUSS ION

The shape of the lactation curve has been studied and Wood (1967, 1968, 1969, 1970, and 1976) has developed algebraic models tc describe the lactation curve in detail. The shape of the curve is known to be affected by many factors such as age, fertility, and season of calving. Environmental factors also play a major role. Wood (1969) found that daily yield was depressed during the winter months and stimulated during spring to an extent that was independent of stage of lactation.

Wood (1972) reported that on 161 completed lactations in a herd kept indoors all year and fed grass silage ad libitum, there was no apparent variation in persistency or weeks to peak yield for animals calving in different months, suggesting that the shape of the curve was substantially the same for all cows irrespective of their calving dates. Wood (1972) concluded that the seasonality of production as previously described was due to changes in feed quality.

It is reasonable on the basis of our current knowledge to assume that given adequate feed, a cow would produce milk according to a "normal" lactation curve; i.e. rise to a peak yield 15-45 days post calving (Wood(1972) found peak yield to occur at 34 days post partum) and then decline at a rate of 10% per month. Variation from this "normal" curve can then be attributed to changes in the feed supply (quantity and/or quality).

Kumar (1981) evaluated the standard cow technique using the Holstein-Friesian herd at the Queensland Agricultural College. He found that while average milk production per cow did not reliably reflect changes in feed supply, the removal of stage of lactation effects using the "standard" cow corrections clearly showed a measure of feed affected fluctuations in milk yield. The use of information on digestible energy intake and stage of pregnancy accounted for 71% of the variation in "standard" cow milk yield.

CONCLUS TONS

The "standard cow" technique is *a* useful aid to problem definition in dairy herd production investigations. In this case the problem areas defined in terms of requirements for further research are late summer and early autumn feed production on irrigated farms, and the late summer-autumn-winter period in dryland farms (See Table 2).

The data from Table 2 indicates that feed quality and quantity decline quite rapidly from January. It also indicates that there are substantial deficiencies in the management and utilization of feed supplies during this autumn period.

Further work is being done on individual farms to investigate the effects of liveweight change, stage of pregnancy and supplementation on the standard cow method.

REFERENCES

ESSLEMONT, R.J. and STEPHENS, A.J.,(1980). "Daisy - The Manual" Reading University.

JOHANSSEN, I., (1961). "Genetic Aspects of Dairy Cattle Breeding" published by University of Illinois, 1961.

KUMAR, V., (1981). "Use of the "Standard Cow" method for investigating nutritional problems associated with milk production". School of undergraduate studies, Qld Agric. College, Lawes.

SUPERCOW, (1981). "Supercow" Upthorpe computer programmes U.K.

WOOD, P.D.P., (1967). Nature 216: 164.

WOOD, P.D.P., (1968). Nature 218: 89.4.

WOOD, P.D.P. ,(1969). Anim. Prod. 11:(3) 307.

WOOD, P.D.P. ,(1970). Anim. Prod. 12: 535.

WOOD, P.D.P. ,(1972). Anim. Prod. 15: 89.

WOOD, P.D.P. ,(1976). Anim. Prod. 22: 35.