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PERFORMANCE OF ONE DAIRY HERD IN THE ZAMBIAN MILK RECORDING SCHEME

BY

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DECLARATION

This thesis has been composed by myself and has not been accepted in any previous application for a degree. The work which this is a record has been done by myself and all sources of information have been acknowledged by means of references.

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ABSTRACT

Milk records of 199 friesian cows, of 1988-89 were collected from Mazabuka Milk Recording Scheme. Fifty-three (53) were heifers, fifty-five were in second lactation, fifty-two were in the third, twenty-five in fourth, twelve in fifth and two were in sixth lactation. Each cow had its own cow card and production chart that showed:

- date of birth of the cow
- sire of the dam
- date of service and calving
- milk production in days recorded
- butterfat content of milk
- date of drying off
- date culled or died.

From this information, averages of production parameters were calculated, such as

- lactation length
- lactation yield
- days taken to peak
- calving intervals

- dry period length
- daily mean and peak yield
- mean butterfat content

And a comparative study of these parameters and ideal lactation curve was done. Milk production of the herd ranged from 4033 Kg in the heifers to 8546 Kg in the sixth lactation. Mean milk production per day was 19.5 Kg, but values ranged from 13.5 Kg in heifers to 31.5 Kg in the sixth lactation. Mean production during peak was 25.9 Kg, but values ranged from 17.2 Kg per day in heifers to 36.5 Kg per day in sixth lactation. Heifers took longer to reach peak (86.1 days) than their mothers (60 days) but values ranged from thirty-one (31) days to two hundred and one days especially among heifers. Herd mean lactation length of 292 days was observed and values ranged from 253 days to 329 days. However, 11.1% of the herd (22 cows) were below 200 days due to severe mastitis, were culled or died before completing the lactation. Meanwhile 12% of the herd (24 cows) was over 350 days and 19% of the herd (38 cows) had 200-260 days of lactation that could have been due to long dry period that would impair production efficiency of the farm. Long lactation lengths of more than 350 days was due to fertility problems probably brought about due to poor nutritional status, diseases and management problems (e.g. detection of heat periods, use of immature bulls etc). Butterfat content of the farm was 3.58% but values ranged from 3.86% in heifers to 3.34% in their mothers. Dairy Produce

Board requirement is at least 3% hence the farm is within the requirement. Heifers had higher butterfat (3.86%) than their mothers (3.34%). Calving interval of the herd was 429.5 days but the range was from 378.8 days to 568 days. 10% of the herd (19 cows) had over 450 days but were masked by 13% of the herd (25 cows) which had less than 335 days. Low herd fertility are probably the causes of long calving intervals. Dry period length of the herd was 82 days which is on the longer side . Shorter dry period (>50 days) indicate that cows remain lactating for longer periods. It is observed that lactation yield of 5711.3 Kg, lactation length of 292 days, butterfat content of 3.58% are quite impressive in view of the tropical conditions. However, calving interval of 429.5 days is too long and be reduced to 336-395 days through reduction of dry period by 2 weeks, since this also (dry period length is on the longer side (82 days). Use of mature bulls, change in management of the farm (heat detection feeding of well balanced rations) and control of diseases such as mastitis would improve the situation on the farm. It is recommended finally, that in later recordings, an economic perspective be included.

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CHAPTER ONE

INTRODUCTION

In Zambia, most dairy farmers are along the line of rail with a few located in Provincial Centres. This is so because of, probably, the availability of infrastructure in these areas such as roads, markets, banks, health centres, etc., so that they can easily obtain the necessary inputs for the dairy enterprise, and can easily and quickly sell their produce.

In Southern Province, these dairy farmers have been mobilised together to form a milk recording scheme called, the Mazabuka Milk Recording Scheme. To this scheme, interested dairy farmers have voluntarily registered and as in 1988-89 figures, only 7 farmers had so far registered with the scheme. This scheme is run by National Artificial Insemination centre.

Recorders of the scheme visit the participating farmers once every week, during which they record each farmer's milk production levels. The participating farmer, during the recording visit, prepares the monthly mutation form which indicates all the mutations in the herd since the last recording. This form carries the following information:

- animals that have calved with their respective dates
- animals that have aborted, dried off, sold, culled or dried

/

with their respective dates.

- in case of heifers and newly bought animals with their respective birth dates and names of sires.

Prior to weekly recording visit, the recorders prepares a new recording sheet in which the following information is filled in:

- age at calving and calving date
- date dried off, if not producing last time it did
- number of the animal or its name.
- production during the previous recording.

For each recorded animal in the herd, a cow card is prepared after the first recording after the first calving or after the animal has entered the herd. These cow cards are not returned to the farmer, except when the animal is removed from the farm.

The lactation figures recorded, are supposed to be analyzed by the staff of the scheme. The results of the analysis are sent back to the participating farmer so that he can know his performance on the farm and adjust his management practices accordingly. However, due to lack of resources required for the analysis of such data, the data is usually taken to other people or institutions.

MILK RECORDS

The value of milk records cannot be over emphasized. Milk records are most often used in day to day management descion to allot concentrates to cows, to cull cows, to breed cows, to dry off cows and to treat cows for diseases and abnormalities. They enable the farmer to see which cow is paying to feed. Milk records provide information that show the weak and strong spots of the dairy enterprise. A study of milk records from dairy cows under good management where feeding, milking routine and general welfare of the animals is satisfactory will provide a background against which errors and mistakes in management can be detected.

In short, the whole essence of keeping milk records in dairy industry is:

(i) To provide a guide in management of cows whereby accurate feeding according to yield can be carried out.

(ii) Milk records are a check on the health of the animals as well as on management factors such as feeding and milking routine.

(iii) Milk records and butterfat testing are the means of assessing the productive ability of the breeding herd and give the information needed in the breeding of better dairy cattle.

(iv) Milk records are important factor in sales of pedigree stock, particularly bulls.

Every successful enterprise needs a record keeping system for effective management and evaluation of the operation. The running of the dairy enterprise without proper keeping of records can be likened to the running of a clock without hands where one can see the activity taking place, but can not see the results.

However, just keeping records without knowing their hidden meaning does no better than running an enterprise without records. A study of records such as this one, is required in order for one to appreciate the value of records.

1.1 OBJECTIVE OF THE STUDY

The essence of this study is to point out the weak spots of the farm under study and hence advise the concerned farmer, the adjustments to be taken in the management practices of the farm.

CHAPTER TWO

2.0 LITERATURE REVIEW

Milk production normally follows pregnancy and calving. The duration of pregnancy in the cow is about 280 days (longer in the tropics), followed by a lactation of 9 months or longer in dairy breeds. A calf every year is generally considered to be the desired frequency for economic dairy farming. Since rest and recovery are regarded as essential between lactations, the breeding year of the cow must be defined within fairly close limits. In order to produce a calf every 12 months, a cow must be successfully served or inseminated 85 days after the previous calving. As by no means 100% of services, let alone inseminations, are fertile, the farmer usually allows the cow to be served 40-60 days after calving (Barret and Larkin, 1972). Practical experience has determined the desirability of a 6-8 weeks dry period which permits a lactation of 10 months in the ideal situation. Most milk recording systems are based on a standard lactation of 305 days length.

The lactation yield of a cow in the tropics are generally lower than comparable cattle in temperate regions. Barret and Larkin (1972) collected production figures from Kenya and Britain of some breeds of cattle, and compared the two. Friesians in Kenya yielded 3467.27 Kg in 461 days compared

to friesians in England that yielded 4165.91 Kg in 378 days. Kenyan friesians therefore showed average of 25% lower yield with no corresponding alteration up or down in butterfat content. Since the majority of East African pedigree stock originated recently from Europe, the effect was arising from management and environment, rather than from genetic causes. High environmental temperature in the tropics are one of the factors contributing to low yield in this region. Animals have got comfort zone. In the tropics, 21°C is the comfort zone for most African breeds (John Oliver et al. 1971). Friesians raised in this environment, with their comfort zone as 18°C, would have difficulty in keeping the temperature of their bodies at normal (38.5°C). In their efforts to lose extra heat they seek shade and cool breezes, drink much water and finally eat less food resulting in reduced milk yield.

It is a well known fact that cows produce more as they grow older. A first calf heifer freshening at 24 months of age, would produce approximately 75% of the milk produced by a mature cow. Cows of most breeds, including the friesians are considered mature when they are about 6 years, though there could be some variations within the breeds. Schmidt and Van Vleck (1973) found that average figures for cows in third, fourth and fifth lactation indicated that they produced 85%, 92% and 98% respectively of the milk produced

by a mature cow. Their reasoning was that as the cow grew older, its reproductive system (including the mammary secretion system), became more developed hence more productive than in heifers which are considered to be still growing and developing (Williamson and Pyane (19[illegible]).

After parturition, the daily milk yield increases rapidly to a maximum between 30 and 70 days of lactation. Thereafter, there is a steady decline at the rate of about 2.5 - 6% per week until the cow is dried off in preparation for the next lactation. The height of the peak is the greatest single determinant of the total lactation yield. Those with high peaks are of high yield, because the decline is from a higher point,, though cows may be still yielding measuring quantities of milk when they are dried off. However, the peak yield of the cow is dependant on her body conditions at calving, her inherited potential, her freedom from metabolic and infectious diseases, and the feeding regime after calving, particularly during the first 3 weeks (Schmidt and Van Vleck, 1973). In a Norwegian experiment conducted by Amir (1974) the peak yield of friesians highly fed post portum was 30.2 Kg as against 30.2 Kg for friesians moderately fed. In another experiment by Wiktorson, 1971, the difference in milk yield between high and standard level fed friesian for 16 weeks after calving was rather small: 25.9 Kg per day for the high level fed cows and 24.4 Kg per

day for the standard level fed cows. Only very small differences in milk yield between high and low grain fed cows during the 180 days period after calving were noted by Rakes and Davenport in the same year. It seems that it is not enough to achieve high fed intake, but rather a high food intake of a diet containing a large proportion of roughage. Flat et al (1961) have shown that during early lactation cows fed on a diet with 60% roughage produced considerably more milk than those fed lower proportions (40% and 20%) of roughage.

However, in the tropics cows usually do not attain the literature value of 35 Kg of milk at peak because of inadequate inclusion of roughage component in the formulated diets and the environmental conditions.

Butterfat percentage is low during the first 2-3 months after calving and then increases and becomes more pronounced at the end of lactation. Generally, heifers have higher butterfat than their mothers because butterfat content is inversely related to milk yield. Butterfat content decreases when yield in milk is reaching the peak at 5th and 6th lactation.

Butterfat varies according to breed. Since the production of butterfat is an inherited characteristic, low butterfat

may sometimes be due to the breed of the cow. A better breed is one with higher butterfat content for, in Zambia, the value of milk is judged by its butterfat content. A friesian cow with an average yield of 6000 Kg of milk per lactation has butterfat content of 3.5% on average (McDonald et al 1987).

Butterfat content also depends on the feed given to the animal. Kibbutz and Gevin (1974) in Israel, fed 80 friesians adult cows with varying concentrate: hay ratio feeds. One was an 80:20 concentrate hay ration fed and the other was 50:50 ratio feed. In both feeds, the roughage component consisted of vetch hay with 12% crude protein. The concentrate component consisted of 77% barley, 10% wheat bran, 10% soybean meal and minerals and vitamins. Results of these cows showed that in 80:20 treatment ratio, butterfat content was depressed to 2.6% while the 50:50 treatment ratio had 3.5% butterfat.

Thomas et al (1983) argued that in tropics, butterfat content of most friesian cows are affected by the environmental temperature. In the survey of friesians of Britain, they discovered that the average butterfat content was 4%. However, in the tropics, it is 3.5%. A lower butterfat content is observed to be associated with continuous heat during summer months. Prolonged periods of

cold is accompanied by higher butterfat content.

The calving interval of a cow is defined as the interval between one calving to the next. The recommended calving interval is one calf every year (Barret and Larkin 1972). The cow lactates for 300-320 days, is serviced 40-60 days after calving in order to get a 365 day interval.

In the tropics, however, cows take longer than one year. Craplet (1963) carried out a survey of dairy cows in South Africa and found that the mean calving interval in this region, was 373 $\pm$ 38 days, depending on the breed. It is for this reason that a range of 336-395 days calving interval in the tropics would be considered as normal. Long calving intervals impairs the production efficiency of the farm while short calving intervals affect the next lactation because the cow has no time for tissue replenishment.

The need for a dry period is well illustrated by a research report on identical twins at the University of Tennessee. In here, five pairs of identical twins were studied for four lactations. Between the first and second, and third lactations, one member of the twin pairs was given 60 days dry period. The other was milked continuously. Between the third and fourth lactations all were given the 60 day dry period. As expected, production of twins was the same

during the first lactation. In the second lactation, the production of the continuously milked twin was 75% of those given the dry period. In the third lactation those that were milked continuously produced 62% as much as twin mates that had a dry period. In the fourth lactation when all had a dry period prior to freshening, the production of groups was again the same. Long dry periods are not necessary. It is generally recommended that cows should be dried 6 weeks before calving. This is for regeneration or renewal of cells in the mammary gland and replenishment of stores of nutrients especially minerals. They should also be dried off to regain good body condition.

CHAPTER THREE

3.0 MATERIALS AND METHODS

Milk records of 199 friesian cows, of 1988-89 that were milked twice per day were collected from Mazabuka Milk Recording Scheme (these were cows of one of the farmers registered to the scheme). The cows were of different ages 53 were heifers, 55 were in their second lactation, 52 in their third, 25 were in fourth, 12 were in their fifth and 2 were in their sixth lactation. Each cow had its own cow card and production chart that had the following;

- date of birth
- sire of the dam
- date on which it was served
- date of calving
- milk production on days recorded
- butterfat content of that milk on days recorded
- date of drying off
- date culled or dried

For each lactation group, averages of the production parameters were calculated. The parameters in question are the following:

- lactation yield
- lactation length

- days taken to reach peak
- calving intervals
- dry period length
- daily mean and peak yield
- mean butterfat content

A comparison was made between these production parameter averages in the herd and the ideal lactation curves.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

The discussion and suggestions made in this report are based solely on comparison made between ideal lactation curves and the calculated data. Any deviations have been noted and possible reasons responsible for such deviations have been speculated. However, the study would have been more accurate and meaningful if an indepth familiarization of the farm operations and management practices of the farm under study was conducted. Additionally, past production figures and any other information related to the farm, would have added some weight to the accuracy and meaning of this report.

4.1 LACTATION GROUP AND MILK PRODUCTION

Milk production of the farm, for each lactation group is shown in tables 1 and 2.mean lactation yield for the total herd was 5711 Kg. The mean values ranged from 4033 Kg in heifers to 8546 Kg in the sixth lactation. Mean milk production per day in the herd was 19.5 Kg and the values ranged from 13.5 Kg per day in heifers to 31.5 Kg per day in the sixth lactation. The mean peak milk production was 25.9 Kg per day and the mean values ranged from 17.2 Kg/day in heifers to 36.5 Kg per day in the 6th lactation.

Table 1 also shows herd mean lactation length of 292 days which also ranged from 253 days - 329 days. The mean calving interval for the herd was 429 days while the mean dry period was 82 days.

Table 2 shows the range of milk production for each lactation group.

Table 1: MEAN PRODUCTION PARAMETERS

Lactation Number	Number of Animals	Lactation Length (day)	Lactation yeild (kg)	Mean Milk Production (kg/day)	Peak Milk production (kg/day)	Butter Fat (%)	Calving Intervals Length (day)	Dry Period length (day)	Called or Dry
1	53	294	4035.2	13.5	17.2	3.86	378.8	77.9	4
2	55	285	4084.3	14.7	20.6	3.76	379.3	88.8	10
3	52	300	5261.3	17.4	24.9	3.67	395.5	93.4	13
4	25	295	6004.6	20.4	27.3	3.50	464.6	87.1	12
5	12	329	6336.8	19.5	28.5	3.34	391.0	78.0	5
6	2	253	8546	31.4	36.5	3.36	568.0	66.0	1
			5711.3	19.48		3.58			

NB Animal with incomplete data were left

Table 2: Milk Production

Lactation No.	Lactation Yield			Time Taken To Reach Peak (Days from calving)	
	Mean (kg/day)	Range (Kg/day)	Peak (kg/day)	Mean (day)	Range (day)
1	13.54	8.7-20.9	17.17	86.1	31-201
2	14.74	7.9-21.0	20.55	57.5	23-136
3	17.44	11.2-24.4	24,88	61.0	27-109
4	20.42	15.9-24.9	27.25	50.5	21-131
5	19.53	16.4-23.4	28.5	67.6	25-129
6	31.4	-	36.5	37.0	-
Herd Average	19.51	-	25.81	59.95	

N.B. Animals with incomplete data were left out

The literature value for friesian cows in tropics is 6000 Kg per lactation with mean butterfat content of 3.5% (McDonald et al. 1987). The herd average on this farm is 5711.3 Kg per lactation (table 1) Based on this comparison, there is no doubt that the farm herd is yielding reasonably well. However, there were other animals that yielded lower than the average especially among heifers. This was due to the fact that heifers are still growing and developing. As a cow grows, its reproduction system, (including the mammary secretion system) becomes more developed hence more productive (Schmidt and Van Vleck, 1973).

The peak mean milk production of friesian in the temperate regions is 35 Kg per day. On this farm, the peak mean for the herd was 25.81 Kg, which is quite good considering the environmental conditions in which these cows are raised. Milk yield is affected by high environmental temperature, for in such an environment, cows spend most of time in the shades (if free range grazing is practised) and takes in a lot of water in order to maintain their body temperature (38.5°C) at the expense of feed hence milk production decreases (John Oliver 1971). However, there is room for improvement. Peak milk yield of the herd can be improved by adequate feeding particularly during the first 3 weeks of lactation. Animals must be provided with high energy concentrate feeds and the finest quality roughages. Since high energy concentrate might cause rumen disorders the

proportion of roughage should therefore not be allowed to fall below 35% of the diet (McDonald et al 1987).

Days taken to reach peak were on average 59.9 days (table 2). Since after parturition the daily milk yield increases rapidly to a maximum between 30 and 70 days of lactation, approximately 60 days was quite impressive. However, heifer took longer (86 days) than their mothers (67 days). Days taken to reach peak ranged from 23 - 201 days. Those in the first lactation took longest time to reach peak. You can achieve optimum peak yield in short period by feeding large quantities of high energy and protein feeds during the first 3 week. Even so recourse to the withdrawal of body reserves is inevitable if milk production is to attain its genetically determined limit.

4.2 LACTATION LENGTH

The lactation lengths of each lactation group are shown in table 3. They ranged from 253 -329 days. However, there were variations with a group. 11% of the herd recorded lactation length of less than 200 days while 12% of the herd had lactation length of more than 359 days. More than half of the herd had normal lactation length (table 3). On average, the herd had a lactation length of 292 days. The recommended lactation length of cow is 10 months which is 300 - 320 days. Schmidt and Van Vleck 1973 recommended that

a cow should lactate for 305 days in order to take advantage of 60 day dry period at the end of the lactation.

These are recommendations for ideal situations. However, Barret and Larkin (1972) recorded breed average yields and lactation lengths for some breeds in Kenya and England. Friesian cows in Kenya recorded an average lactation length of 461 days while those in England scored 378 days. Williamson and Pyane (1975) and Mahadevan (1955) recommended a lactation length of 260 - 270 days and less than 300 days respectively. It was for these reasons that a range of 260 - 350 days was considered as normal for friesian raised in the tropics. A herd average of 292 days (table 3) was quite impressive. They could have lactated for longer time than this, but because of the environmental conditions. High temperature reduces feed intake thereby indirectly affecting the growth and development of the animal (Pyane, 1969, Williamson and Pyane, 1975, John Oliver, 1971, and Barret and Larkin 1972).

However, as already stated, 11% of the herd had below 200 days of lactation length while 12% had over 350 days. Those that were below 200 days of lactation could have not completed their lactation cycle because they either died, had severe mastitis therefore were dried off earlier or were culled probably due to their low yield. Too short lactation

lengths seems to be due to diseases like mastitis etc, abortions that later disrupt the animal general body welfare hence disrupt productive ability of the animal or due to culling for some reasons. 19% of the herd had lactation length of 200 - 260 days. This may be due to long dry periods that would impair production efficiency of the farm. If they aborted, this could have been due to deficiency in some nutrient such as vitamin A. This can be corrected by supply of good pastures or well cured hay as well as good silage especially during the dry season (Pyane 1969). Abortions could also have been due to diseases such as leptospirosis, infections postular vulvovaginitis (a viral disease common in the tropics) (Pyane 1969). As all dairy farmers use artificial insemination this could be probably ruled out.

The 12% of the herd with over 350 days of lactation length could be due to fertility and management problems faced by the farm. A normal lactation length (300-320 days gives more milk per day on average than do long drawn out lactations with many days of low yield at the tail end. Optimum lactation length also depends upon the value of another calf against more milk in later lactation. Although long lactation are better for individual cow yield, optimal lactations are better for animal herd productivity. Maximum annual yield appears to accrue if the cows are mated to

calve once every 356 - 395 days. Fertility problems of the herd could have been due to management. In here, herdsman could have failed to detect heat periods of the cows. This entailed late conceiving of the served cows. Timing of service in natural hand mating or artificial insemination during the oestral period has already been cited as a factor that must be observed for best fertility results. Cows observed to be in heat for the first time in the morning should be inseminated in the afternoon of that day.

Poor fertility could have been due to probably nutritional status of the cows. Low energy intake delay puberty and general growth and developmental process in the animal. Wiltbank et al (1965) reported that conception rates were greatly increased in animals that received high energy feeds. He also postulated that post pastum intervals to first oestrous were greatly increase by low energy rations fed to cows. However, Reid et al. (1963) contradicted this report. He found that high energy intake depressed fertility. This was also reported by Quinlan (1929) who also found that a large percentage of overfat cattle, due to high energy intake, in South Africa, were sterile. Inspite of all these contradictions, it is still a sound recommendation that cows should be fed rations that have a proper balance of energy, protein minerals and vitamins and that have sufficient quantities of these nutrients to meet

Table 3: Average Lactation length and variation within each group

Lactation Number	Number of Animals	Average Age (Years)	Mean Lactation Length (day)	Abnormal < 200 days (Animals)	Too Short 200 - 260 (Animals)	Normal 261 - 350 days (animals)	Too long > 351 days (Animals)
1	53	1.81	294	4	9	30	10
2	55	2.87	285	4	14	30	7
3	52	4.17	300	6	7	37	2
4	25	4.75	295	6	6	11	2
5	12	-	329	1	1	7	3
6	2	-	253	1	1	0	0
	199	-	295	22	38	115	24

N.B. Animals with incomplete data were left out

their growth and development of reproductive capacity and lactation requirements.

4.3 BUTTERFAT CONTENT

The mean butterfat content of the milk of each lactation group is shown in table 1. It ranged from 3.34% to 3.86%. Generally heifers have got higher butterfat percentage than cows. Butterfat decreases after 5th and 6th lactation.

Butterfat percentage is low during the first 2-3 months after calving and then increases and becomes more pronounced at the end of lactation. friesians raised in tropics have an average butterfat content of 3.5% (McDonald et al 1987), for butterfat depends on the breed, stage of lactation age of the cow and the nutritional status of the cow (Russel and Williams 1972). Butterfat content on this farm was averaging 3.58% (table 1). This is within the requirements of Dairy Produce Board (D.P.B.) which buys most of the milk produced in Zambia DPB requires milk to have at least 3% butterfat and any extra butterfat above this limit is rewarded for to the farmer.

Heifers had higher butterfat content than their mother because of the inverse relationship that exist between milk yield and the butterfat content. The higher the yield, the less the butterfat content of that milk. The butterfat

content is lower than temperate region (4% for friesians) because of the effects of high temperature. A lower butterfat percentage is observed to accompany continuous heat during summer times (Thomas et al 1983).

However, the farm should aim at higher butterfat content than this (3.58%) because in Zambia, the value of milk when sold to DPB is judged by its butterfat content. The higher the butter that is in the milk, the more money the farmer gets. The farm can improve the butterfat content by supply of at least one third of dry matter as roughage. Roughage intake can be increased by spraying with molasses. High concentrate feed will depress butterfat content.

4.4 CALVING INTERVAL

The average calving interval of the herd is shown in table 4 with each lactation group average. The interval ranged from 378.8 days to 568 days. The herd average was 429.5 days which is too long. In fact about 10% of the herd (19 cows) had calving intervals of over 456 days. 13% of the herd (25 cows) had short calving interval of less than 335 days. Long calving intervals may be due to low fertility in the herd which may in turn be due to a number of reasons such as low intake of well balanced rations in energy, proteins, minerals and vitamins, particularly during the first 3 weeks after calving, diseases such as leptospirosis,

infections postular vulvovaginitis etc. poor management aspects such as failure to detect heat period, use of immature bulls (if uncontrolled breeding) etc.

Long calving intervals impairs the production efficiency of the farm, while short calving intervals affect the next lactation performance because the animals are not given enough time to renew and repair their tissue. Aim at having one calf per year or at least ' 336-395 days calving interval, 261-350 days of lactation, 30-75 days of dry period and about 60 days interval between calving and mating.

Table 4: Calving Interval

Lactation Number	Mean Calving Intervals (day)	Number of Animals	Short <335 days (Animals)	Normal 336-395 days (Animals)	Long 396-455 days (Animals)	Too long > 456 days (Animals)
1	378.8	44	12	20	7	5
2	379.3	43	8	22	9	4
3	395.5	37	4	18	9	4
4	464.6	11	0	6	2	3
5	391.0	7	1	4	1	1
6	568.0	1	0	0	0	1
	429.5	143	25	70	29	19

NB: Animal with incomplete Data left out

4.5 DRY PERIOD LENGTH

The dry period length for different lactation groups are shown in table 5. The average for the herd was 81.9 days. It is usually recommended that cows should be dry for at least 30-40 days, but preferably for 50-75 days between lactations.

Generally the average dry period at this farm is on the longer side. A protracted period of more than 75 days between the end of lactation and the next calving is of course quite ruinous to the production efficiency of the farm (lower milk yield and production). Shorter dry periods (<50 days) may indicate that cows remain producing longer after the last calving. This will result into poor milk production in the next lactation because there is less time for tissue repair. It may entail possible poor conception rate.

It is necessary to reduce the dry period at this farm by at least 2 weeks in order to increase the production efficiency of the farm. The end of lactation should be imposed if milk production does not drop considerably within 30-50 days of impending calving.

Cows should be in good condition at the time of drying off. If not they should be fed well during the dry period, but not over conditioned.

Table 5: Lenght of Dry Period

Lactation Number	Number of Animals	Mean dry Period (day)	Short Period < 50 days (Animals)	Normal 50 - 75 days (Animals)	Long > 75 days (Animals)
1	44	77.9	4	26	14
2	40	88.9	6	14	20
3	34	93.0	8	10	16
4	11	87.1	3	2	6
5	5	78.0	0	4	1
6	1	66.0	0	1	0
	135	81.9	21	57	57

N.B. Animals with incomplete data were left out

CHAPTER FIVE

5.0 *CONCLUSION AND RECOMMENDATIONS*

Firstly it is important to note that these suggestions are based on the records supplied. The total milk is based on one recording per week and therefore is only an estimate of the true total. True milk production values for individual animals might deviate from this estimate. Note secondly, that the whole picture becomes distorted if the records is a poor estimate of the true lactation values.

There is no doubt that the farm is performing reasonably good given the environmental conditions and circumstances. A lactation yield of 5711.3 Kg per lactation for friesian, is comparatively good. The lactation length of 292 days is impressive for it is within the tropical range (260-350 days). The butterfat content is within the limits required by the major buyer of the produce, Dairy Produce Board (DPB), of at least 3% while the farm produces milk with 3.58% butterfat. However there is need to increase it because the value of milk is judged by butterfat content. It is therefore advisable that cows be supplied with at least one third high quality roughage in order to increase the butterfat at the farm. Spraying with molasses of this roughage will facilitate intake.

Diseases such as mastitis seem to have an effect as shown by short lactation lengths in some cows. These were either dried off earlier or were culled due to low yield. Efforts must be made to control it. This can be done by carrying out a "dry cow therapy" where cows, on drying off day, receive a tube of "dry cow antibiotics" into each quarter of their udder after the last milking in their lactation (Barret and Larkin, 1972). Reduction of the herd mastitis problem to a low level would lead to, a reduction of veterinary bills thereby reducing indirectly the culling rate, and increase in milk yield.

The calving interval of the herd (of 429.5 days) is too long (table 5). There is need to reduce it to 336-395 days. This can be through the reduction of dry period, which is also on average, on the longer side (82 days) by 2 weeks. The dry period would be reduced by imposing drying off if milk yield of the cow does not fall considerably within 30-50 days of impending calving.

Fertility in the herd seems to be a problem particularly among heifers. Improvement in management as regards the detection of heat periods, use of mature bulls (if controlled breeding) and maintaining a ratio of 1:40 of bulls to cows, would greatly improve the herd fertility situation on the farm. Nutrition to pregnant cows should

also be seriously looked into to avoid abortions due to lack of nutrients. Provide high energy, proteins, minerals and vitamins balanced rations to the cows.

Hay of good quality would offset vitamin A deficiencies. At the end of the lactation period, milk production declines, food intake reaches its maximum and body weight due to repletion of body stores, increases, it is important to remember that responses in milk production and conception rate during the early lactation depends on supplementary feeding in late lactation, the dry period and at that time. Finally it is suggested that in later recordings an economic perspective be included.

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