PERFORMANCE OF SAHIWAL-FRIESIAN COWS UNDER GRAZING AND STALLFEEDING MANAGEMENT

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ABSTRACT

Ten Sahiwal-Friesian first lactating cows were divided into two groups to determine the effect of grazing and stallfeeding management on their performance. It was observed that period of lactation significantly affected the average total milk production ($P < 0.01$) and body weight change (BWC) ($P < 0.05$). There were no significant ($P > 0.05$) effect of interaction between lactation period and feeding systems on the average total milk production and on BWC. Milk yield declined as the lactation progressed except for the grazing cows during the first five months of study, where an increase of about 1.8% in milk yield was observed. No significant differences between the treatment groups in length of calving to first estrus (60.8 days vs 86.8 days), conception rate (3.0 vs 3.6), length of calving to conception (131.8 days vs 171 days), calving interval (409.2 days vs 447.8 days) and birth weight of calves (26.6kg vs 29.4kg). It is concluded that grazing cows tend to produce more milk and obtain slightly better reproductive performance than stallfed cows.

(Key words: Sahiwal-Friesian Cow, Grazing, Stallfeeding, Management.)

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KINERJA SAPI PERAH SAHIWAL-FRIESIAN DENGAN MANAJEMEN DIGEMBALA DAN DIKANDANGKAN

INTISARI

Sepuluh ekor sapi Sahiwal-Friesian laktasi yang pertama telah digunakan dan dibagi secara acak menjadi dua grup untuk melihat pengaruh penggembalaan (*grazing*) dan pemberian pakan di kandang (*stallfeeding*) terhadap kinerjanya. Hasil penelitian menunjukkan, bahwa periode laktasi mempengaruhi total produksi susu ($P<0,01$) dan perubahahan berat badan (BWC) ($P<0,05$). Interaksi antara periode laktasi dengan sistem pemberian pakan menunjukkan pengaruh yang tidak signifikan ($P>0,05$) terhadap purata produksi susu dan BWC. Hasil susu menurun dengan meningkatnya waktu laktasi, kecuali untuk sapi yang menyenggut rumput selama lima bulan penelitian, dimana dijumpai peningkatan produksi purata sekitar 1,8%. Estrus pertama setelah beranak (60, 8 hari vs 86,8 hari), angka kebuntingan (3,0 vs 3,6), waktu antara setelah sapi beranak sampai terjadi kebuntingan (131,8 hari vs 171,4 hari), jarak beranak (409,2 hari vs 447,8 hari) dan berat lahir pedet (26,6 kg vs 29,4 kg). Dapat disimpulkan, bahwa sapi-sapi yang digembalakan cenderung menghasilkan susu lebih banyak dan memiliki kinerja reproduksi sedikit lebih bagus dari pada sapi-sapi yang dikandangkan.

(Kata kunci: Sapi Sahiwal-Friesian, Digembalakan, Pemberian Pakan di Kandang, Manajemen.)

Introduction

A number of factors is known to affect the productivity of dairy cows. Under smallholding situations where landholdings are small, farmers generally allow their cows to graze on native pasture after milking and/or stallfeed them with cut grass. At present, there are many introduced species of grasses common for feeding cows. Among various forage species *Setaria splendida* seems to have potential for grazing, while *Panicum maximum* (Guinea grass) and *Pennisetum purpureum* (Napier or Elephant grass) for greenchop. Since grasses do not provide all the nutrients especially energy needed by cows, concentrates are fed to make up such deficiencies and result in profitable production (Herriot *et al.*, 1965). He further stated that forage alone, cows were only able to produce 65 to 75% as much as milk produced by cows supplemented with moderate to heavy amount of grain.

Fluctuation of milk yield between individual of Sahiwal-Friesian (SF) cows was very high. Mustapha (1985) recorded average milk yield of about 4.21, Cheah and Kumar (1984) noted yield ranges from 4.6 to 6.21, but in 1985, Kumar and Cheah also reported average milk yield of SF cows of about 7.21/cow/day.

The objective of this experiment was to study the performance of Sahiwal-Friesian cows when subjected to either grazing or stallfeeding with a supplementation concentrate.

Materials and Methods

Ten first lactation cows used in this study were randomly and equally divided in order of calving into two groups. Cows were hand milked. The first group (group A) was assigned to strip grazing on 0.8 hectare of *Setaria splendida* pasture, representing a stocking rate of 6.25 milking cows/hectares. This pasture was divided into four paddocks and each paddock was used for 7 days strip grazing. The other group (Group B) was stallfed chopped Guinea grass (*Panicum maximum*) cv. Hamil. The rates of fertilizers applied to Splendida were 2.0 kg N and 0.5 kg K_2O_5, while Guinea pasture received 1.25 kg N, 0.5 kg P_2O_5 and 0.5 kg K_2O_5/ha/day. Group A remained on pasture at all times except when brought in for milking. Cows were hand-milked twice a day at 7 AM and 3 PM. Calves were tied close to their mother during milking. Milk let-down was initiated by allowing the calf to suckle for a few seconds. Concentrate made up of 75% ground yellow corn, 15% soybean oil meal, 5% fish meal and 5% molasses were fed to both groups of cows at the rate of 1.0kg concentrate per 2.0 kg of milk yielded. Proximate analyzed of feed (AOAC, 1970) were done and metabolizable energy (ME) were estimated following equation given by MAFF (1975). After milking the calves were allowed to suckle their dams for about 15 minutes, and calves were weaned at 60 days of age. Milk yield and BWC recorded were subjected to statistical analysis following factorial design, while other parameters found were subjected to *t*-Test as outlined by Steel and Torrie (1980).

Result and Discussion

Nutritive value of feeds

Table 1. showed the nutritive value of feeds on dry matter basis. The higher crude protein (CP) content of Splendida (13,6%) then Guinea grass (7.7%) can be attributed to the higher rate of fertilizer applied and to the stage of growth when the grasses were harvested (four weeks of age for splendida and about six weeks for Guinea). The CP content of Splendida and Guinea grass in this study were comparable to the report given by Bogdan (1977), Gerpacio and Castillo (1979) and Bo Gohl (1981). However, is was slightly lower than the report given by Romziah (1986). Vincente-Chandler *et al.* (1961) reported that CP content of Pangola grass increased with increasing nitrogen application from 5.5% at zero N to 10.8% at 900 kg N and 12.0% at 1.800 kg N. Regardless of the amount fertilizer applied, Devendra (1975) reported that Splendida harvested at four and six weeks intervals yielded average CP content of 13.0 and 16.0%, respectively, but Guinea grass var. Serdang at 6 weeks of age only contained about 9.6% CP, while var. Tanganyika contained 6.9% and at 8 weeks of age contained about 6.3% CP.

The mean ME contents of 9.9 and 7.6 MJ/kg DM for Splendida and Guinea grass, respectively, corresponded well with the values reported by Lane and Mustapha (1983a, 1983b) and the ME value for concentrate 913.6 MJ/kg DM) was as expected.

Based on three months study (Soetrisno *et al.*, 1984) on a live weight basis, total DM intake (DMI) was 2.6% for grazed and 2.7% for stallfed cows. This is similar to a figure of 2.6% of LW reported for stallfed Friesian-Local Indian Dairy (LID) cows kept by smallholders (Jamak

TABLE 1. NUTRITIVE VALUE GRASSES AND CONCENTRATE (DM BASIS)

Feeds	CP (%)	ME (MJ/kg)
Setaria splendida	13.6	9.9
Panicum maximum	7.7	7.6
Concentrate	17.8	13.6

and Ngah, 1982). If the feed intake is related to both LW and milk yield (Y), the standard equation derived under temperature conditions is: DMI = 0.025 LW + 0,01 Y (MAFF, 1975). Allowing the same effect of milk production on intake, the equations for the present study are: DMI_{grazed} = 0.0239 LW + 0.1 Y; $DMI_{stallfed}$ = 0.0247 LW + 0.1 Y. Thus it appears that the intake of first lactation Sahiwal-Friesian cows were close to values predicted by the MAFF (1975) equation.

Milk yield

Prior to the commencement of the study (about four months after calving), average milk production of grazing cows (278.5 kg/cow/month) was lower than that of stallfed cows (278.8 kg/cow/month). However, soon after the start of the experiment the position was reversed and stayed that way until the end of the study with grazing animals consistently having a higher total milk yield over stallfed animals. Statistical analysis showed that there were no significant ($P>0.05$) effects of animals and feeding systems on milk production, but there were significant effect of lactation period ($P<0.01$), interaction between animals and lactation period ($P<0.05$), and interaction between feeding systems and lactation period ($P<0.05$) on milk production. The individual length of lactation for grazing cows were: 378, 429, 302, 287 and 287 days with average of 336.6 ± 64.0 days, while for stallfed cows were: 360, 346, 386, 386 and 346 days with average of 364.8 ± 20.2 days. The difference in length of lactation between two groups was not significant ($P>0.05$). Table 2 shows that during the eight month period of study, the mean milk yield for grazed and stallfed cows was 255.1 and 203.4 kg/cow/month, respectively. Milk yield decreased significantly ($P<0.05$) with increasing period of lactation from 291.0 kg in the first month to 137.6 kg/cow/month in the eight month of study. There were significant differences ($P<0.05$) in milk yield within the groups and generally milk yield of cows decreased significantly as the lactation progressed. The total milk yield including the yield before treatment were 13,319.5 and 11.916.0 kg, respectively.

The rate of decline in milk yield, especially for grazed cows up to seven months of study (1.5% and 2.2% per week for grazed and stallfed cows, respectively) was slightly smaller than the rate of decline reported by Whittemore (1980) and Haresign (1981) who observed that the milk yield declined at the rate of 2.0 to 2.5% per week after reaching the peak yield at four to 10 weeks after parturition. The decline in milk yield corresponded to the lactation curve reported for high yielding first lactation Friesian cows on *ad libitum*

TABLE 2. MONTHLY MILK YIELD (KG) FOR GRAZED AND STALL-FED COWS

Treatments	No. cows	Period of study 1	2	3	4	5	6	7	8
Grazed	1	273.2	249.9	226.3	209.1	203.4	182.1	177.1	129.9
	2	274.0	266.1	261.0	258.0	244.8	215.9	183.5	140.9
	3	342.6	287.0	296.9	288.0	283.5	237.4	199.8	133.1
	4	325.3	381.6	372.4	362.4	336.3	295.9	258.5	219.1
	5	294.5	351.4	309.0	277.9	262.9	226.9	214.6	150.9
Stall-fed	1	250.2	197.5	174.1	161.1	141.5	91.8	94.2	60.0
	2	289.0	238.8	211.2	215.3	218.5	201.8	180.1	131.1
	3	256.9	189.5	162.3	162.3	108.2	98.9	94.3	58.8
	4	294.3	301.4	297.6	304.7	286.4	224.0	211.7	164.7
	5	310.4	279.7	280.8	274.2	276.0	232.2	221.2	187.2

Mean for Feeding System	Grazed	Stallfed
	255.1	203.4

Mean for Animals	1	2	3	4	5
	176.4	220.7	200.0	289.8	259.4

Mean for period of study	1	2	3	4	5	6	7	8
	291.0 e	274.3 de	259.2 d	251.4 cd	236.1 c	200.7 b	183.5 b	137.6 a

Animals X Period of Study		1	2	3	4	5	6	7	8
	1	261.7 nopq	223.7 ijk	200.2 fghi	185.4 defg	172.5 de	137.0 b	135.7 b	95.0 a
	2	281.5 qrst	252.5 lmnop	236.1 klm	236.9 klm	231.7 jkl	208.9 ghij	181.8 def	136.0 b
	3	299.8 stu	238.3 klmn	229.6 jkl	225.2 jk	195.9 efgh	168.2 cd	147.1 bc	96.0 a
	4	309.8 uv	341.5 x	335.0 wx	333.6 vwx	311.4 uvw	260.0 mnopq	235.1 kl	191.9 defg
	5	302.5 tu	315.6 uvw	294.9 rstu	276.1 pqrs	269.5 opq	229.6 jkl	217.9 hijk	169.1 ed

Animal X Feeding Systems		1	2	3	4	5
	Grazed	206.4[b]	230.6[c]	258.5[d]	318.9[e]	261.0[d]
	Stallfed	146.4[a]	210.7[bc]	141.4[a]	260.6[d]	257.7[d]

Means with different subscripts are significantly different at the 5% level of probability

feeding (Neilson *et al.*, 1981). In the present study, the average decline in milk yield for grazed and stallfed cows 1.9 and 2.4% per week with average daily milk yiled per cow of 8.5 and 6.8 kg, respectively. The average daily milk yields were higher than the yield of SF cows (about 5.0 kg/cow/day) reported by Mahaputra (1983) and Wong *et al.*, (1987). However, Wong *et al.* (1987) also reported a higher milk yield for those under rotational grazing supplemented with 4.0 and 6.0 kg of concentrate per cow per day (9.0 to 10.8 kg milk/cow/day). The higher milk yield and persistency of grazed cows compared with the stallfed cows in this study can be attributed to the higher intake of digestible nutrients.

Body weight change

Monthly body weight (BW) of grazed and stallfed cows ranged from 364.0 to 398.0 kg and from 373.6 to 420.0 kg, respectively. There were fluctuations in the average BW change (BWC) (Table 3). On the average, grazing cows lost weight in the first month (-5.0 kg/cow), while stallfed cows lost their weight in the second (-12.8 kg/cow) and third month of study (-6.2 kg/cow). However, there was no significant ($P>0.05$) effect of animals (2.3 to 7.9 kg), feeding systems (4.0 to 5.2 kg), interaction between lactation period and individual cow (-15.0 to 40.0 kg) and lactataion period and feeding systems (0.4 to 8.1 kg) on the average BWC. Average BWC significantly ($P<0.05$) affected by period of lactation were observed in the second (-3.1 kg) and third month of study (-3.0 kg) and significantly ($P<0.05$) different with the others.

The loss in BW of grazed cows (in the first month) and stallfed cows (up to third month) was appropriate for cows in mid-lactation. Haresign (1981) reported that, during mid and late lactation, the energy status of the cows moves from negative to positive value. This was achieved not only by increased DMI capacity, but also by gradual change in the partitioning of nutrients away from milk production and towards body tissue deposition. During the 240 days of study, grazed cows gained more weight (41.5 kg/cow) than stallfed cows (33.0 kg/cow). This body weight gain supports the report given by Neilson *et al.* (1981) who found that body weight gain per lactation for mature Friesian, Ayrshire and Jersey was about 35, 30 and 25 kg, respectively.

Reproductive performance

There were no significant ($P<0.05$) effect of feeding systems on the length of calving to first estrus (60.8 days vs. 86.8 days), number of inseminations per conception (3.0 vs. 2.5), length of calving to conception (131.8 days vs. 171.4 days), calving interval (409.3 days vs. 447.8 days) and birth weight of calves (26.6 kg vs. 29.4 kg). Grazing cows which calved late tended to require lower services per conception, but not for stallfed cows. Table 4 shows the mean of reproductive performance values.

In this study the first estrus for grazed cows (60.8 days) was comparable to the report given by Mahaputra (1983) (59.0 days) but not for the stallfed cows (86.8 days). Haresign (1981) reported that Friesian cows which lost less than 35.0 kg body weight during early lactation had a mean interval to first service of 72 days. The number of services per conception for either grazed (3.0) or stallfed cows (3.6) were high, although these values were slightly better than those (3.9) reported by Jamak and Ngah (1982). The higher number of services per conception would cause longer service periods and calving intervals. The length of service periods for the grazed

TABLE 3. BODY WEIGHT CHANGE (KG/MONTH) FOR GRAZED AND STALL-FED COWS

Treat-ments	No. Cows	Period Of Lactation 1	2	3	4	5	6	7	8
Grazed	1	-18	17	11	14	9	11	8	13
	2	- 4	6	4	6	1	4	2	5
	3	11	4	-20	50	13	11	11	-31
	4	- 8	4	8	10	4	6	7	3
	5	- 6	2	- 2	8	9	9	12	
Stallfed	1	44	-30	- 4	18	9	7	8	9
	2	- 3	11	-10	16	5	4	6	5
	3	- 4	6	-10	30	2	4	3	4
	4	29	-19	-12	12	4	5	3	6
	5	20	-32	5	3	0	2	1	4

Mean for Feeding Systems	Grazed	Stall-fed
	5.2	4.0

Mean for Animals	1	2	3	4	5
	7.9	3.6	5.3	3.9	2.3

Mean for Study	1	2	3	4	5	6	7	8
	6.1^{ab}	-3.1^{a}	-3.0^{a}	16.1^{b}	5.5^{ab}	6.3^{ab}	5.8^{ab}	3.0^{ab}

Animals X Period Of Study		1	2	3	4	5	6	7	8
	1	13.5	-6.5	3.5	16.0	9.0	9.0	8.0	11.0
	2	-3.5	8.5	-3.0	11.0	3.0	4.0	4.0	5.0
	3	3.5	5.0	-15.0	40.0	7.5	7.5	7.0	-13.5
	4	10.5	-7.5	2.0	11.0	4.0	5.5	5.0	4.5
	5	7.0	-15.0	1.5	2.5	4.0	5.5	5.0	8.0

Animals X Feeding Systems		1	2	3	4	5
	Grazed	8.1	3.0	6.1	4.3	4.3
	Stallfed	7.6	4.3	4.4	3.5	0.4

Means with different subscripts are significantly different at the 5% level of probability.

and stallfed cows were 131.8 and 171.4 days,a nd the calving interval were 409.2 and 447.8 days, respectively. The inability of cows to produce calves within a year was attributed to the longer length of service period that should have occured not more than 3 months after calving.

Conclusion

Based on the results of this study it can be concluded that Sahiwal-Friesian cows under grazing system of management showed slightly better performance than the

TABLE 4. MEASUREMENTS (MEANS ± SE) REPRODUCTIVE PERFORMANCE OF GRAZED AND STALL-FED COWS

Measurements	Grazed	Stall-fed	T-test
Calving to first estrus (days)	60.8 ± 19.0	86.8 ± 26.7	1.77^{ns}
Number of service per çonception	3.0 ± 2.5	3.6 ± 1.9	0.42^{ns}
Calving to Conception (days)	131.8 ± 98.9	171.4 ± 49.5	0.80^{ns}
Calving interval (days)	409.2 ± 101.7	447.8 ± 37.9	0.79^{ns}
Birth weight of calves (kg)	26.6 ± 6.0	29.4 ± 4.0	0.86^{ns}

stallfed one. However, further study have to be done to evaluate the long term effect of different feeding systems.

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