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C. B. Browning

W. C. Cowsert

W. D. Craft

J. T. Miles

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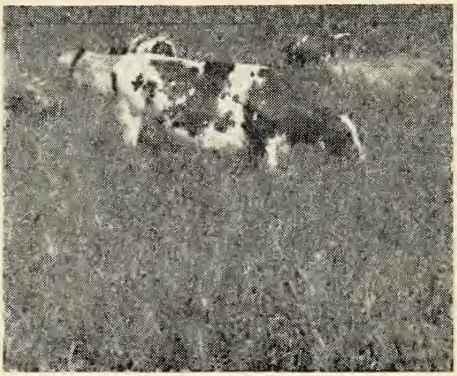

Permanent vs. Temporary Summer Pastures For Milk Production

MISSISSIPPI STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION
HENRY H. LEVECK, Director
STATE COLLEGE MISSISSIPPI

Summary

Milk production per cow was higher and persistency of production greater for cows while grazing Sudan grass than while grazing either Coastal Bermuda or Dallis grass. Dallis grass was higher in quality than Coastal Bermuda.

Coastal Bermuda pasture provided more cow-days and produced more nutrients per acre at a lower feed cost per 100 pounds of milk than did either of the other two grasses. These differences were greater during dry years, indicating a greater drought resistance for Coastal Bermuda.

In a situation where daily production per cow is more important than total yield per acre greater emphasis must be put on the higher quality temporary pasture crops.

PERMANENT VS. TEMPORARY SUMMER PASTURES FOR MILK PRODUCTION

By C. B. BROWNING, W. C. COWSERT, W. D. CRAFT and J. T. MILES

Most dairymen are convinced that summer pasture crops offer the cheapest source of feed for milk production. However, the choice between temporary pasture (summer annuals) and permanent pasture (summer perennials) is often difficult because of a lack of information on the relative value of these pasture crops.

The purpose of this report is to furnish information on the comparative value of typical summer perennials and annuals based on Experiment Station grazing tests in 1958, 1959, and 1960. The Dairy Department at Mississippi State University compared Coastal Bermuda. Dallis grass, and Sudan grass pastures in this study. Tift Sudan was used in 1958 and Greenleaf in 1960. No Sudan was grown in 1959.

In general a uniform system of management was used for the three years work reported. Two to four two-acre paddocks of each pasture crop were used each year. The permanent grass paddocks were established in 1954 and 1955. The Sudan grass paddocks were in oats for winter grazing prior to seeding and the Sudan was plowed up by September 15 to allow seeding of oats for the next winter grazing period.

Maintenance applications of phosphate and potash were applied each fall on the basis of soil tests. Ammonium nitrate was split into three equal applications, the first being applied as a top dressing to the permanent pastures in the spring and to the temporary crops at planting. All pasture crops received 400 pounds of ammonium nitrate per season, with the exception of the irrigated crops in 1959 which had 500 pounds. The pastures were clipped 2 to 3 times per season to maintain optimum quality of forage.

The effect of irrigation on the amount and quality of forage produced was studied in 1959 and 1960. A sprinkler system was used and water was applied in 1959 to provide approximately two inches of rainfall and irrigation water each 10 days. However, in 1960 an estimate was made of plant available moisture in the upper 24 inches of the soil, plant water use, and evaporation loss. Irrigation water was applied as needed to insure a soil moisture level within the range between field capacity and 50% of the estimated plant available soil moisture capacity.

Each year milk production was measured in carefully controlled grazing trials using groups of selected "tester" cows. In four of the five trials reversal type designs of 63 and 84 days were used. The cows were rotated from one type of grass to another after 21 or 28 day periods according to the design of the trial. The non-irrigated study in 1960 was a continuous trial with 4 cows per treatment. Six "tester" cows per treatment were used each year in the reversal designs giving a total of 18 in 1958 and 1960, and 24 in 1959. In all of the trials the cows were rotated between two or more paddocks of the same grass to insure top quality grazing at all times. In addition to the "testers" other cows were used as necessary on each paddock to keep the grass grazed to the proper intensity.

Pasture productivity was measured in terms of the average total 4% milk yield per acre and by calculating the average total digestible nutrients (TDN) per acre harvested by the cows. Body weights were recorded on the third, fourth, and fifth days after the cows started grazing and on the last three days before they were

moved from one paddock to another. These figures were used to determine any gain or loss of body weight. The cows were on pasture 18 to 20 hours each day. They were removed only for milking.

A simple 16% crude protein grain mixture was fed according to milk production at the rate of approximately one pound for each four pounds of 4% milk.

Forage Quality

The results of the trials designed to determine the quality of the three pasture grasses are summarized in Table 1.

In the three trials where Sudan grass was compared with the permanent grasses it supported a higher level of production. The cows grazing Sudan produced approximately 7% more milk daily than those on Dallis grass and 12% more than the Coastal Bermuda cows. They were also more persistent in production. Their average decline in production for the 4-week test periods was only 3.7% as compared to 11.6% for the cows on Dallis grass and 26.6% for the Coastal Bermuda cows.

Coastal Bermuda was compared with Dallis grass in 5 trials in the 3-year period of this experiment. Animals grazing Dallis grass produced more milk per day than those on Coastal Bermuda in each case except the non-irrigated trial in 1960 where there was no significant difference in production. The average daily production for the five studies was 33.3 pounds for the cows on Dallis grass and 31.7 pounds for the cows grazing Coastal Bermuda grass. The difference in average persistency of production was even more marked. The cows grazing Dallis grass were approximately 12% more persistent than those grazing Coastal Bermuda grass.

Total Forage Production

Coastal Bermuda has consistently produced more forage per acre than either Dallis grass or Sudan grass. Figures in Table 2 show that Coastal Bermuda grass produced approximately 34% more TDN per acre than Dallis grass and 48% more than Sudan. The 5 trial average of 4% milk produced per acre was 5,007 for Coastal Bermuda grass and 4,269 for Dallis grass. This difference in forage production is also reflected by the cow days grazing obtained per acre which averaged 222 for Coastal, 140 for Dallis, and 107 for Sudan, and by the total milk produced per acre which averaged 4,764 pounds for Coastal Bermuda, 3,764 for Dallis and 3,529 for Sudan.

Irrigation Increased Total Forage

Total forage production of all three grasses was increased by irrigation (Table 2). During the dry summer of 1960, milk production per acre was 35% greater on irrigated Coastal Bermuda than on non-irrigated. The difference was 70% on Dallis grass and 30% on Sudan grass. An average of 10.5 inches of irrigation water per acre was applied from May through August, 1960 (Table 3).

Approximately 5.0 inches more rainfall was recorded during the five-month summer period of 1959 than in 1960, therefore the effect of irrigation on forage production was not as great.

There seemed to be no significant difference in the quality of the forage due to irrigation. The only valid comparison of this is shown by the figures in Table 1 for the 1959 grazing trial comparing Coastal Bermuda and Dallis grass—both irrigated and non-irrigated. In this trial there was ample grass for the "tester" cows and there was no significant difference in average daily production or persistency of production between the irrigated and non-irrigated treatments within a grass specie. The 1960 figures for irrigated and non-irrigated cannot be compared so far as average daily production is concerned since the irrigated treatments were in a reversal trial and the

non-irrigated in a continuous designed trial with different animals. Furthermore, grazing at times was limited in the non-irrigated trial due to drought.

An economic consideration of irrigation for pastures will not be presented due to the limited amount of data available from these studies; however, the increased cost of producing milk on the irrigated pastures is shown in Table 4. A charge of $2.50 per acre inch of irrigation water was charged to each pasture paddock involved.

Cost and Income

If the cost of irrigation is not considered, the yields obtained during the 5 trials from the three grasses may be regarded as representing "normal," dry, and wet years. Based on this principle, the average total feed cost of producing 100 pounds of milk during the three comparable years was $.93 on Coastal Bermuda, $1.18 on Dallis grass and $1.61 on Sudan grass (Table 4).

The total amount of forage produced per acre governs to a large extent the carrying capacity and therefore the total amount of milk produced per acre for pasture grasses. Pasture yields, therefore, have a marked effect on the cost of producing milk. The higher feed cost of producing 100 pounds of milk from the lower yielding Sudan grass was also in part due to the establishment cost of approximately $16 per acre which was charged to the feed cost for the Sudan pastures. No establishment cost was added to the maintenance cost of the permanent pasture grasses. The establishment cost for Coastal Bermuda or Dallis grass is relatively high and a pro-rated share should be added to the maintenance cost during the first 4 to 5 years.

As shown in Table 4 the average income above total feed cost calculated for the "tester" cows was $1.35 for Coastal Bermuda and Dallis grass, and $1.29 for Sudan grass with the milk sold on a Grade A market at $5.30 per hundred. When calculated at a Manufacturing milk price of $3.10 per 100 pounds the values would be $.67 for Coastal, $.64 for Dallis, and 0.52 for Sudan.

An economic comparison of these grasses may be made on the basis of a constant-sized herd. Based on average values for the three trials in which temporary and permanent grasses were compared, 22 acres of land would be required for a 40-cow herd grazing Coastal Bermuda during a 120-day season. These 40 cows would produce 1,483 cwt. of 4% milk. The same herd would require 34 acres of Dallis grass pasture and would produce 1,570 cwt. of milk, and 45 acres of Sudan grass pasture and produce 1,680 cwt. of milk.

At $5.30 per cwt. for 4% milk and an average feed cost of $0.93 for producing 100 pounds of milk on Coastal and $1.61 on Sudan the income above feed cost would be $6,481 for the 40-cow herd grazing Coastal Bermuda, and $6,199 for the cows grazing Sundan. The income above feed cost for the Dallis grass cows would be $6,468. However, the 22 or 34 acres of land in permanent pasture would be occupied for 12 months whereas the 45 acres of Sudan land would be free for a temporary winter crop.

Results of this study indicate that carefully managed Coastal Bermuda pasture used in connection with limited acreage of higher quality temporary pasture crops should fit well into the pasture program on some Mississippi dairy farms. However, milk production from Coastal Bermuda grass would be much lower than in the 5 trials of this study if the pastures were not carefully managed. A system of rotational grazing management wherein the early growth of Coastal Bermuda is grazed by the milking herd, followed by dry cows and yearling heifers seems to be the most desirable.

A further consideration must be given

Table 1. Quality of summer pasture forage as indicated by the performance of "tester" cows during trials in 1958, 1959, and 1960.

Year[1]		Coastal Bermuda				Dallis Grass				Tift or Greenleaf Sudan			
		Av. daily prod. per cow[2]	Persistency[3]	Daily body wt. change per cow	Grain: milk ratio	Av. daily prod. per cow[2]	Persistency[3]	Daily body wt. change per cow	Grain: milk ratio	Av. daily prod. per cow[2]	Persistency[3]	Daily body wt. change per cow	Grain milk ratio
		lbs.	%	lbs.	lbs.	lbs.	%	lbs.	lbs.	lbs.	%	lbs.	lbs.
(1) 1958	Non-Irr.	28.1	71.4	+.72	1:5.0	31.5	91.2	+.19	1:5.6	32.4	98.8	—.04	1.4.5
(2) 1959	Irr.	33.0*	83.4	—.03	1:3.0	34.0	87.1	—.57*	1:3.2	—	—	—	
(3)	Non-Irr.	32.9*	84.9	+.53	1:3.0	34.2	89.6	—.62*	1:3.3	—	—	—	
(4) 1960	Irr.	35.0*	72.3*	—.28	1:3.5	37.5	93.4	—.45	1:3.3	40.2	98.6	—.30	1:3.6
(5)	Non-Irr.	29.7	76.4	..	1:3.7	29.1	80.6	..	1:3.6	32.4	91.6		1:2.8
Av., lines 1, 4, 5		30.9	73.4	+.22	1:4.07	32.7	88.4	—.13	1:4.17	35.0	96.3	—.17	1:3.63
Av., lines 1-5		31.7	77.6	+.24	1:3.64	33.3	88.4	—.36	1:3.80				

[1]In 1958 data from irrigated paddocks was questionable due to high rainfall; therefore, results are not presented. Two different trials in 1960 reversal design for irrigated study and continuous design for non-irrigated study.

[2]4% fat-corrected-milk.

[3]Average values based on the percentage change in production during each 28 day period.

*Significantly different from other treatment means in the same trial at .05 level of probability.

Table 2. Yields of milk and feed value and carrying capacities for irrigated and non-irrigated summer pastures.

Year		Coastal Bermuda			Dallis Grass			Sudan Grass		
		Milk prod. per acre[1]	TDN/A from pasture[2]	Cow days grazing/A	Milk prod. per acre[1]	TDN/A from pasture[2]	Cow days grazing/A	Milk prod. per acre[1]	TDN/A from pasture[2]	Cow days grazing/A
		lbs.	lbs.	days	lbs.	lbs.	days	lbs.	lbs.	days
(1) 1958	Non-Irr.	4543	3167	263	4347	2601	206	2235	1051	83
(2) 1959	Irr.	5707	2163	215	5567	1675	188	—	—	—
(3)	Non-Irr.	5033	1843	160	4489	1557	134	—	—	—
(4) 1960	Irr.	5894	2875	236	5352	1862	152	4903	1608	136
(5)	Non-Irr.	3856	1998	168	1592	843	62	3451	1556	101
Average, lines 1, 4, 5		4764	2680	222	3764	1769	140	3529	1405	107
Average, lines 1-5		5007	2409	208	4269	1708	148	—	—	—

[1]4% fat-corrected-milk.

[2]Total digestible nutrients (TDN). A measure of the total feed value secured from pasture.

to persistency of production by dairymen concerned with high levels of daily production per cow. For example, based on the average persistency values of 73% for Coastal and 93% for Sudan, a herd averaging 45 pounds per cow at the start of the summer grazing period would average approximately 38 pounds per cow at the end of 100 to 120 days of grazing Sudan grass, whereas those on Coastal Bermuda would average less than 15 pounds per day.

Table 3. Monthly rainfall and average amount of irrigation applied to each irrigated paddock.

	1958	1959		1960	
Month	Rainfall	Rainfall	Irrigation	Rainfall	Irrigation[1]
			Inches		
May	4.62	6.10	----	3.25	1.25
June	4.95	2.04	1.50	1.99	1.81
July	9.39	2.19	2.75	1.39	4.90
Aug.	2.50	2.50	3.00	2.79	2.54
Sept.	3.41	3.09	2.34	1.39	----
Total	24.87	15.92	9.59	10.81	10.50

[1]Irrigation was discontinued during September, 1960.

Table 4. Cost and income figures for irrigated and non-irrigated summer pastures.

Year		Coastal Bermuda			Dallis Grass			Sudan Grass		
		Feed cost 100 lbs. milk[1]	Income above feed cost/cow/day[2]		Feed cost 100 lbs. milk[1]	Income above feed cost/cow/day[2]		Feed cost 100 lbs. milk[1]	Income above feed cost/cow/day[2]	
		$	Grade A	Mfg.	$	Grade A	Mfg.	$	Grade A	Mfg.
(1) 1958	Non-Irr.	0.92	1.23	61	0.94	1.37	.68	1.74	1.15	.44
		(1.59)[1]	---		(1.58)	---	---	---	---	---
(2) 1959	Irr.	1.17	1.36	64	1.15	1.41	.66	---	---	---
(3)	Non-Irr.	1.19	1.35	63	1.25	1.39	.63	---	---	---
		(1.29)	---	---	(1.46)	---	---	(2.08)	---	---
(4) 1960	Irr.	0.84	1.56	79	0.97	1.62	.80	1.54	1.51	.63
(5)	Non-Irr.	1.03	1.27	62	1.64	1.07	.43	1.55	1.22	.50
		(1.08)	---	---	(1.35)	---	---	(1.74)	---	---
Av., lines 1, 4, 5		0.93	1.35	.67	1.18	1.35	.64	1.61	1.29	.52
		(1.20)	---	---	(1.37)	---	---	---	---	---
Av., lines 1-5		1.03	1.35	.66	1.19	1.37	.64	---	---	---

[1]Includes cost of concentrates fed and all seed, labor and fertilizer cost involved in the establishment of the temporary pastures and in the maintenance of permanent pastures. The figures in ( ) include the cost of irrigation at $2.50 per acre inch of water.

[2]Based on the average daily production of the "tester" cows, av. feed cost per cwt., and a price per cwt. of $5.30 for Grade A and $3.10 for manufacturing milk.