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A SYSTEM for PROCESS MILK PRODUCTION in the BLACK BELT of ALABAMA

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Black Belt Substation

A practical and economic system for producing process milk has been developed at the Black Belt Substation. Seven years' operation of a dairy unit shows an increase in income to labor and management (without subsidy) from an average of $11.65 per acre for the first 4 years to an average of $29.33 per acre for the last 3 years.

In the original Progress Report, No. 21, published October 1945, the Black Belt Substation presented the work done during the first 4 years, March 1941 to March 1945 (Period I), when pastures and hay fields were being developed. The present report includes also results for Period II, March 1945 to March 1948, when pastures and hay fields were well established. In order to show progress, comparative results between the two periods are summarized, and changes made to improve the management system are explained.

It is pointed out that the comparison shows a significant upward trend in production and downward trend in cost of production.

Purpose of Experiment

It is the purpose in the operation of this dairy to produce milk as cheaply as possible. The plan involves three major objectives:

1) To establish a cropping program that furnishes as nearly as possible both year-round grazing and additional feed requirements.

2) To increase fertility of the soil by use of legumes and fertilizers.

3) To practice a controlled breeding program so that cows freshen in the spring when abundant grazing lowers feed cost at the season when milk production is at its peak.

Setup of Experiment

Land. In the spring of 1941, 80 acres of unproductive land on the Black Belt Substation was set aside for an experimental Grade B dairy unit. Most of this area is lime soil, varying from white hill tops to darker bottom lands. A small amount of acid soil is included in the tract.

Cash outlay. The only improvements on the tract when set aside for the experiment were a tenant house and a well. Cash outlays for necessary improvements were as follows:

25 grade Jersey heifers (springers)	$971.00
Milking shed	122.73
Fencing (barb wire)	232.20
Water system	60.95
Milk utensils	75.25
Total cash outlay	$1,462.13

The experimental Grade B dairy unit is not a self-contained farm. That is, it does not own such necessary farm machinery as tractors, mowers, and the like. The Substation furnishes this equipment and charges the unit at prevailing custom rates. Likewise, the cost of extra labor is charged to the unit.

Herd. At the beginning of the project in 1941, 25 grade Jersey heifers were bought from farmers in Elmore County, Alabama. These heifers were springers and all of them calved within a short time after being moved to the unit. Except for one year, a purebred Jersey bull has been used to breed the cows. Since no replacements were needed that one year, a beef bull was used and the resulting calves were sold as vealers. A fee of $2 per head was charged for bull service.

Culls and replacements. In order to maintain production, it has been necessary to cull one or more cows each year for various reasons. Heifer calves from the best cows have been saved and grown out for replacements. No additional cows have been bought during the periods covered by this report.

Herd management. The breeding schedule has been planned so that cows will be in production during the grass and clover season. The bull is turned with the cows the first of June so that calves are dropped beginning the first half of March. The cows are given their rest period in the winter months when grazing is less abundant.

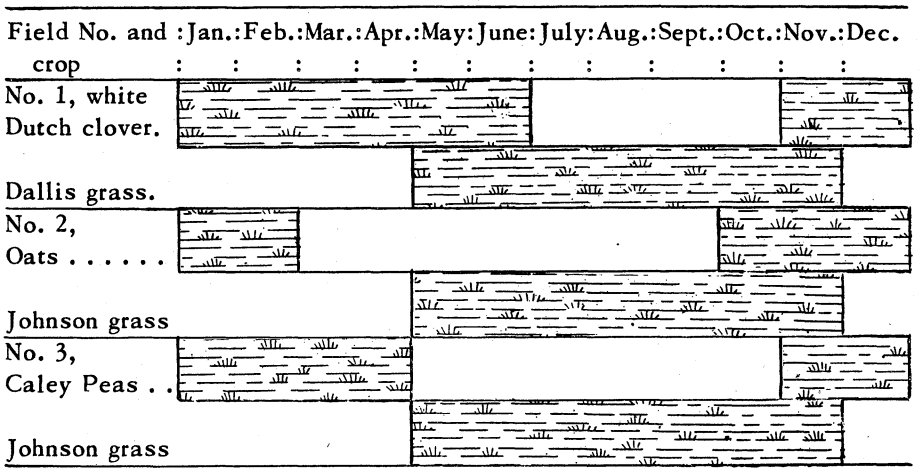
Labor. The regular labor required for operation of this dairy unit is supplied by a negro man and his wife. However, the unit does not require all of the man's time, and he works about half-time on other parts of the Substation.

Cropping System

Based on the Substation's results and experiences, a cropping system was planned to provide grazing and hay. The 80 acres of open land was divided into three separate fields in order that the tract might be managed to obtain a maximum amount of feed the year around. The crops and acreages are as follows:

Field No. 1	Field No. 2	Field No. 3
Permanent pasture 44 acres	18 acres	18 acres
White Dutch clover followed by Dallis grass	Oats followed by Johnson grass	Caley peas followed by Johnson grass

The three fields supply grazing and a reserve of hay for the entire year. The shaded portions of the following diagram shows the months that each crop in the cropping system furnishes grazing.



Seeding. In 1941 it was necessary to prepare and plant the areas. Field No. 1, the permanent pasture, was disked and sown with 3 pounds of white Dutch clover per acre. Dallis grass straw was distributed over this field to seed Dallis grass. No other seeding has been necessary because both plants are perennials.

Field No. 2 was broken, harrowed, and sown with 2½ bushels per acre of Texas Rustproof oats about the middle of September. This field is broken and seeded to oats each year. Volunteer Johnson grass follows the oats.

Field No. 3 was disked and sown with black medic in the fall at about 10 pounds per acre. This plant, a reseeding annual, was grown for about 4 years. The area was then disked and planted in the fall with Caley peas, a reseeding legume, at the rate of 40 pounds of seed per acre. Volunteer Johnson grass follows the pea crop.

At times during the 7-year period, it has been necessary to sow Johnson grass when the stand has been injured by drouth or by encroachment of some such crop as wiregrass.

Rotation of oats and Caley peas. If Fields No. 2 and No. 3 were equally adapted for growing oats, a 6-year rotation would be practiced, whereby each field would be sown to oats for 3 years in succession, followed by Caley peas for 3 years. However, since Field No. 2 is a well-drained area and is better adapted to oats, the following 4-year rotation on the two fields is more practical:

Field No. 2 . . . . Oats, 3 years . . . . . Caley peas, 1 year
Field No. 3 . . . . Caley peas, 3 years . . . . . Oats, 1 year

Importance of early planting of oats. In order to secure a maximum of winter grazing, oats are planted as nearly the middle of September as weather permits. Immediately after the oat crop is harvested in June, the land is broken to allow the soil to settle and thereby reduce excessive damage from winter tramping. This early preparation creates a reservoir to hold moisture from summer rains to assure early germination of the oats. Early breaking for oats also stimulates the

volunteer growth of Johnson grass that follows. The Johnson grass may be either harvested for hay or grazed as needed. In September the oats are drilled in the standing Johnson grass. The dairy herd is grazed on the Johnson grass until the oat crop develops sufficiently to furnish forage.

Cropping system makes use flexible. It is pointed out that four crops overlap in the spring and fall. Also, two or more crops are available for grazing throughout the year. (See diagram, page 3.) Thus, the system provides considerable flexibility in using and managing the forage crops grown. For example, if dry or cold weather slows down plant growth on a field being grazed, the dairy herd is transferred to one of the other fields.

Field No. 1, permanent pasture, is grazed at all seasons when it furnishes ample grazing. If for any reason the grazing becomes short during the year, the herd is transferred to Field No. 2 or No. 3.

Field No. 2 (oats followed by Johnson grass) supplies winter grazing from the first of October through February. At the beginning of March, the cattle are removed and the oats are top-dressed with nitrate of soda. The herd may be transferred to Field No. 1 or No. 3. In May the oats are cut in the dough stage and stacked as a reserve for winter feed.

Field No. 3 (Caley peas followed by Johnson grass) is used either for grazing or for hay.

Fertilizers. During the first 4-year period, Field No. 1 (white Dutch clover and Dallis grass) and Field No. 3 (Caley peas and Johnson grass) received annual applications of about 300 pounds per acre of superphosphate as a top-dressing in the fall. During the later 3-year period, 0-14-10 has been broadcast at the rate of about 400 pounds per acre each fall.

Field No. 2 (oats and Johnson grass) has received annual applications of 200 pounds per acre of superphosphate at planting time during both periods. Early in March it also has been given a top-dressing equivalent of 70 to 100 pounds of nitrate of soda.

While the recommended rate of nitrate of soda is 100 to 200 pounds per acre, it has been necessary to use less because of the limited supply of commercial nitrogen.

Under the 4-year rotation when oats were grown on Field No. 3 and Caley peas on Field No. 2, the fertilizer treatments for the two fields were reversed.

Feeding of supplements. The cows were bred to begin calving in March. It has been the plan to produce all of their roughage requirements on the 80-acre unit and to supplement with cottonseed meal or peanut meal only when necessary. Since at the beginning of the project the soil was at a low level of fertility and there was no established pasture or cropping system, it was necessary to buy and feed meal at all seasons of the year during Period I. However, in Period II, producing cows were fed only in March and April. Limited amounts of meal were needed at this period to correct the effects of lush growth of early clovers. For the remainder of the year, grazing and hay furnished adequate feed.

In the last year of Period II, 9 young calves and heifers were fed 2,400 pounds of calf feed.

The following is the average amount and cost of meal bought annually for cows in production in the two periods:

Period	Amt. of meal	Rate per ton	Total cost
I, 1941-45	8.87 tons	$42.17	$374.07
II, 1945-48	.916 tons	64.48	59.06

Returns from Grade B Dairy Unit

The following tables are financial summaries of the Grade B dairy for the two periods. Table I is a statement of the returns and costs on the entire unit; Table II gives the same information broken down on a per-acre basis.

Table I. Production, Sales, Costs, and Income, Grade B Dairy Unit, Black Belt Substation, 1941-48

80 acres - 25 cows

Items	1941 - 45 average	1945 - 47 average
Cash Receipts		
Milk	$ 1,772.80	$ 3,027.54
Bonus paid by cheese plant	$ 30.88	$ 30.00
Cows	$ 79.10	$ 230.20
Calves	$ 54.45	$ 49.85
Miscellaneous (seed and grain)	$ 397.34	$ 210.13
Total	$ 2,334.57	$ 3,547.72
Cash Expenses		
Fertilizer	$ 187.01	$ 332.98
Feed	$ 374.08	$ 95.86
Cultivating and harvesting	$ 188.30	$ 244.00
Hauling milk to cheese plant	$ 219.36	$ 352.53
Seed for planting	$ 22.05	$ 62.25
Taxes	$ 41.03	$ 39.71
Miscellaneous	$ 142.81	$ 85.70
Total	$ 1,174.64	$ 1,213.03
Financial Summary		
Cash receipts	$ 2,334.57	$ 3,547.72
Cash expenses	$ 1,174.64	$ 1,213.03
Net cash income	$ 1,159.93	$ 2,334.69
Inventory (increases or decreases)	$ +6.50	$ +251.01
Income to capital and labor	$ 1,166.43	$ 2,585.70
Capital investment (average)	$ 3,912.81	$ 3,999.45
Return to capital (6%)	$ 234.77	$ 239.97
Return to labor and management	$ 931.66	$ 2,345.73
Labor cost	$ 532.40	$ 611.25
Return to management	$ 399.26	$ 1,734.48
Return to capital and management	$ 634.03	$ 1,974.45
Milk subsidies received (not used in figures above)	$ 300.08	$ 296.77
Milk production per 80-acre unit (actual sales)	77,704 lb.	97,176 lb.

Table II. Per Acre Production, Sales, Costs, and Income, Grade B Dairy Unit, Black Belt Substation, 1941-48

Item	1941 - 45 average	1945 - 47 average
Milk produced per acre	971 lb.	1,215 lb.
Sales of milk per acre	$ 22.55	$ 38.22
Other Sales per acre*	$ 6.64	$ 6.13
Change in inventory per acre	$ .08	$ 3.14
Total income per acre	$ 29.27	$ 47.49
Fertilizer cost per acre	$ 2.34	$ 4.16
Feed cost per acre	$ 4.68	$ 1.20
Other costs per acre**	$ 10.60	$ 12.80
Total costs per acre	$ 17.62	$ 18.16
Gross cost of milk per 100 lb. exclusive of labor	$ 1.81	$ 1.49
Other income per 100 lb. of milk***	$ .69	$ .76
Net cost of milk per 100 lb. exclusive of labor	$ 1.12	$ .73
Gross cost of milk per 100 lb. including labor	$ 2.50	$ 2.12
Other income per 100 lb. milk***	$ .69	$ .76
Net cost of milk per 100 lb. including labor	$ 1.81	$ 1.36
Income to labor and management per acre	$ 11.65	$ 29.33
Income to management per acre	$ 5.00	$ 21.69
Average amount of fertilizer applied per acre	291 lb.	367 lb.
Average amount of feed fed per acre	222 lb.	33 lb.
Average price of milk per 100 lb.	$ 2.32	$ 3.15

* Includes sale of cattle, Dallis grass seed, and grain.

** Includes planting and harvesting, hauling milk to cheese plant, seed for planting, taxes, interest on investment, and miscellaneous items. Labor cost not included.

*** Other income includes sale of cattle, seed, and grain plus change in inventory, which is an income that must be deducted from cost of production.

Note: Figures above do not include payment of Federal subsidies to the unit.

The average amount of milk sold per cow per year was 3,108 lb. for the first period and 3,887 lb. for the last period. These figures do not include home use of milk and milk consumed by heifer calves grown out for replacement. Considering entire production of the herd, the per cow production for the last 3-year period ran between 4,100 lb. and 4,200 lb.

Comparisons of the two periods. The cash returns from the 2 periods are not comparable, since in Period II higher prices were received for milk and higher prices paid for all expense items. The following comparisons of basic items are significant.

		Period I	Period II
In Period II	25% more mineral fertilizer used (per acre)	300 lb.	400 lb.
	90% less bought feed (per acre)	222 lb.	23 lb.
	25% more milk produced (per acre)	971 lb.	1,215 lb.
	25% lower cost of milk production (per cwt.)	$ 1.81	$ 1.36[1/]

1/ Includes labor

Observations and Conclusions

(1) It is evident that good pastures and a cropping system that supply approximately year-round grazing are basic requirements in the economic operation of a dairy.

(2) A 2-crop system consisting of a legume followed by grass, increases the amount of feed produced, and at the same time raises the fertility level of the soil.

(3) By increasing the rate of application of mineral fertilizers, more feed is produced; therefore, the amount of feed purchased is materially reduced.

(4) Use of perennial and reseeding plants in a cropping program reduces labor requirements.

(5) Raising of heifers from the best producing cows and sired by good purebred bulls is a sound economic practice.

(6) Culling of low-producing cows is essential.