Adjustments for North Central Oklahoma Wheat Farms

By E. A. Tucker and Odell L. Walker

A Study of Profitable Uses for Land Taken Out of Wheat Production in North Central Oklahoma

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Farm programs designed to reduce farm output force farmers to consider alternative uses for their resources. Such programs strike with greatest force those areas which have a decided advantage in the production of a single crop which is to be reduced substantially under the program. North Central Oklahoma is such an area. Wheat, the chief crop, has been reduced about 40 percent since 1952. Under these circumstances, farmers are interested in discovering the most profitable alternative uses of their land, labor and capital. Obviously, change from the first choice enterprise, wheat, to a second choice enterprise involves a reduction of income.

Additional complications arise from the fact that a very great part of the farmer's total expenses are fixed in the short run. He cannot reduce his total expenses by 40 percent just because he is required to reduce his wheat acreage by this amount. His family living expenses, interest, ad valorem taxes and much of his depreciation and maintenance expenses on machinery and buildings remain nearly constant.

This bulletin reports results of a study designed to provide data for farmers to use when making adjustments in the farming program. The study involved three parts: (1) evaluation of present cropping systems and production practices, (2) evaluation of new cropping systems and "recommended" production practices, and (3) comparison of present livestock operations with a new livestock program.

Results of this study are directly applicable to an area of more than 4.5 million acres in north central Oklahoma; 850,615 acres with permeable subsoil and 3,693,767 acres with heavy subsoil (Figure 1). It is estimated that results of the study apply to some 9,000 farms.

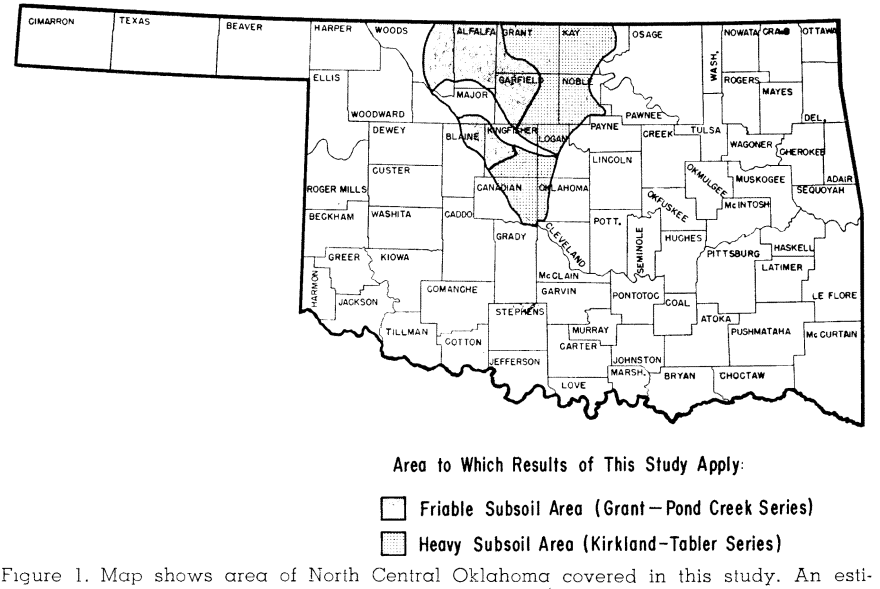

Figure 1. Map shows area of North Central Oklahoma covered in this study. An estimated 9,000 farms are included in the more than 4½ million acres surveyed.

How the Study Was Made

In the planning stage of the study, it was expected that "budgets" would be prepared for four farms typical of north central Oklahoma wheat farms. The farms were chosen to represent conditions on each of the four major soil groups in the area. Pond Creek and Grant soils were selected to represent the friable subsoil group; Kirkland and Tabler to represent the heavy, impervious subsoil group.

As the work progressed, it became evident that crop and livestock adaptations, as well as production practices, were generally very similar for farms on different types of soil. In the interest of simplicity, budgets were prepared for only one farm typical of the Kirkland-Tabler, heavy subsoil group.

Station agronomists provided estimates of probable yields with the usual production practices and varieties and with the use of recommended production practices and varieties. These recommendations were made on the basis of the most recent research findings. Information on present production practices was obtained from personal interview of 84 farmers located in seven counties in north central Oklahoma.

Effects of changes in production practices were evaluated by the use of "partial budgets." This method does not require the determination of total income and expenses, but rather determines the amount of

change in income and expenses to be expected from two or more lines of action. Current prices at the time of the study were used to prepare the budgets.

Superiority of recommended practices, varieties and organizations, were indicated in terms of increased income. Returns of labor, management, land and other capital were used as a measure of advantage of a particular line of action. (In view of the limited life of the acreage reserve, it was not considered as an alternative in this study.)

Farm Adjustments for the Area

Typical Farm Organization, Current Conditions: A 480-acre farm was used to indicate how individual adjustments in land use, the livestock program and changes in production practices would fit together. The impact of recommended changes would generally be proportionate for farms larger or smaller than the 480-acre unit.

Wheat farms of 480 acres in this section of the state usually have about 360 acres in cultivation, 100 acres in native pasture, and the remaining 20 acres in farmstead, roads, etc.

Wheat, oats and alfalfa occupy most of the cropland. Other crops include grain sorghum, sorghum for forage, barley and spring-sown summer pastures. Wheat allotments usually amount to roughly 60 percent of the cropland; in this case a 216-acre wheat allotment. Oats or oats and barley account for about 90 acres. The remaining 54 acres are divided between alfalfa, sorghums and temporary pastures.

The typical farming system may be identified as a cash-grain, cow-calf farm. Some farmers do buy stocker calves to put on wheat pasture when it is available, but this is not a usual practice. Cattle are high grade or often purebred. Cow-calf herds, common in the area prior to the current wheat restriction program, have been expanded in recent years except as continued dry weather forced contraction. Calves are generally born in the spring and sold at weaning time or at the end of the winter wheat pasturing season a year later. Stocking of the native farm pastures has averaged about 4½ acres per animal unit. Native pastures provide scant forage due to chronic overstocking coupled with prolonged summer droughts. Temporary pastures provide some summer grazing. However, the practice of feeding hay or other stored forage to beef cattle during dry summers is not unusual.

Family labor equivalent to about 1.5 man units is adequate for the usual farm operations. Labor is hired during the wheat harvesting

and plowing season. Probably about one-half of the wheat in the area is custom harvested. Most of the hay is baled by custom operators and additional help is employed in gathering and hauling bales.

Most farms of 480 acres have two tractors to permit early plowing after harvest. Often the second tractor is bought as an alternative to plowing night and day with one tractor and as, "insurance" against the delay in farm work in case of mechanical failure of a single tractor. Mowers and rakes are generally found on these farms but row-crop equipment is less common. Small grain equipment is often used to plant and cultivate row crops.

The typical land use and livestock program is shown in Table I for a farm of 480 acres on Kirkland-Renfrow soils. Land use yields and livestock numbers are very similar for farms in the Tabler soil group. Farms located on Grant and Pond Creek soils would have similar crop and livestock programs, but with somewhat higher yields.

Present production practices as applied to wheat are at a very satisfactory level. Recommended varieties are seeded on well prepared seed beds in good time. First choice of land and production practices is given to wheat. Alfalfa also receives preferred attention in terms of land selection and seed bed preparation. Other crops, oats and barley primarily, receive the farmer's attention after he has attended to his major crop. As might be expected, seed bed preparation, varieties and timing are frequently inferior for other crops when compared to the attention given to wheat.

Summer fallow is not generally a desirable practice in this area. Formal rotations are seldom followed. Small grains, alfalfa and sorghums do not fit well into a definite rotation. Farmers usually have not found the use of a legume crop for soil improvement to be desirable in this area.

Recommended Crop Production Practices

Wheat: The major recommendation for wheat is the application of 100 pounds of superphosphate per acre. It is estimated that this would increase yield by two bushels per acre and net returns by $1.28 per acre (Table II). The use of superphosphate is the only recommendation included in the calculations.

While most farmers are planting recommended varieties, this matter needs to be given additional consideration. The practice of seeding an early maturing variety (Triumph) to permit the crop to escape yield

reductions from early summer drought has been adopted by many. Late freeze damage is a more serious threat for those growing the early variety. Triumph is usually a good choice for those farmers who grow wheat on heavy soils which are particularly susceptible to early summer drought damage. Some farmers feel that they can hedge against yield reductions by growing about equal amounts of the early-maturing variety (Triumph) and a mid-season maturing variety. While they are laying themselves liable to two hazards, they are not risking their whole acreage to either hazard.

This line of action also extends the harvesting season over a greater period of time, a real advantage to those who plan to operate their own harvesting machines but possibly a disadvantage to those who hire custom harvesters.

Experiment Station wheat variety tests indicate that Concho, a variety which usually matures from 6 to 10 days later than Triumph, is a good choice of variety except for the most droughty soils. The advantages of an early-maturing variety may not justify the reduction in yields indicated by Experiment Station tests. Hence Concho would be the variety recommended for all but the most droughty soils. This recommendation is based on experimental results in variety tests and does not agree with farmers' experience with the 1957 crop. Experience of this one year should probably be considered as "once in 50 years" and should thus not be used as the sole basis in selecting varieties.

Oats: Shifting to fall seeded oats (Cimarron or Forkedeer) and the use of 100 pounds of superphosphate are major recommendations. It is expected that these changes in practices would increase yields by 14 bushels and increase income by about 100 percent (Table II). In addition, the recommended varieties when seeded in the fall will provide a great deal of pasture in favorable years. When fall seedings cannot be made, then winter varieties seeded in January or early February would be desirable in terms of production. While resulting yields could be expected to be 5 to 10 bushels below yields from fall seedings, they would still be substantially above spring seedings of the usual varieties not fertilized. When moisture is available for early spring seeding, the use of 100 pounds of 10-20-0 would be more desirable than 0-20-0.

Barley: Farmers of this area who grow barley generally treat it as if it were of slight importance. A majority of the farmers interviewed did not know the variety they were growing. Tenkow was the most frequently named variety. Agronomists recommend either Rogers or Har-

bine. Earlier seeding of fall barley (September) has proven to be desirable in Experiment Station tests.

Farmers in the area have expressed little interest in barley, both verbally and by their actions in choosing to plant a greater acreage of oats. Their lack of interest stems from unsatisfactory yield experience and the tendency for a barley crop to nurture insects which are injurious to other crops.

Eliminating spring seeding of barley in favor of recommended fall varieties seeded in September could be expected to increase average yields substantially. The average yield could be increased even more with the use of insecticides now available. Thus it appears that the new varieties of barley have much to offer.

Yield and income increases (Table II) come from using superphosphate and from planting improved varieties early in the fall.

Alfalfa: Soils of the heavy subsoil group (Kirkland, Tabler and Renfrow) are not well adapted to the production of alfalfa, as indicated by average yields of from 1 to 1.5 tons per acre. Summer drought frequently limits production to one or two cuttings but makes the production of a seed crop more probable. Friable subsoil groups (Grant, Pond Creek and Nash) are better adapted to alfalfa and have a yield expectation of 1.5 to 2.5 tons. The use of 200 pounds of superphosphate at seeding time and a similar application each spring thereafter as long as the stand is retained is recommended. Soil tests of individual fields are recommended to determine the need for lime. For the heavier soils these fertilization practices are expected to increase average yields from 1.2 to 1.4 tons per acre.

Grain Sorghum: Experience indicates that grain sorghum does not compete successfully with oats, barley and alfalfa. The reasons for this are (1) it is frequently grown on the less productive land, often as a "catch" crop, and (2) varieties planted are not carefully selected. Use of average quality land, adapted varieties, recommended seeding rates and well-prepared seedbeds should increase yields about three bushels per acre. The fact that growers were often unable to name the variety they were growing was taken as an indication that they were not greatly concerned with varieties.

Even with yield increases as indicated (Table II) and a net return increase of $2.60 per acre, grain sorghum does not appear to be a serious competitor on the heavier soils.

Somewhat more satisfactory returns could be expected from growing this crop on soils with more permeable subsoils. However its competition from other crops would be correspondingly higher. Then too there are some difficulties in rotating land which includes one year of grain sorghum.

Forage Sorghum: Points made regarding the production of grain sorghum generally apply equally to forage sorghum insofar as choice of land and selection of varieties are concerned.

Recommended varieties are Atlas, Sumac 1712, Sugar Drip and Leoti. Planting as early in May as weather permits increases the chances for the crop to develop ahead of chinch bug infestation. Usually seedings are made in 32- to 40-inch rows, though closer rows may be found, especially when planting is done with a small grain drill with part of the holes stopped. Seeding rates should be about 4 pounds per acre when forage is grown for silage. Some harrowing or cultivation is generally done between the rows for moisture and weed control.

Planting recommended varieties at correct seeding rates would lower costs slightly even without an increase in yield. Higher quality silage should be expected.

Sorghum for hay when seeded to the recommended varieties should yield slightly more than at present though here, as with silage, the gain would be minor unless seedings were put on better land than is now the usual case. Yields range from one to four tons per acre of dry forage.

German millet is frequently used as a hay crop. Its chief advantage is that it matures in from 45 to 60 days and thus may follow crops harvested in the early summer if moisture is available.

Small Grains for Hay and Pasture: Small grains are favored by many in the area as a source of hay and pasture. Climatic conditions normally favor winter and spring growing crops and these crops can be seeded with available equipment. Studies indicate that small grains, when grazed out completely, yield about 100 percent more forage than they do when grazing is limited to permit a grain crop to mature.

A mixture of small grains; barley or winter oats; and rye, with hairy vetch provides more continuous full-season grazing and winter hardiness than an un-mixed seeding. While many farmers seem to prefer wheat as a grazing crop, tests indicate that other small grains produce more forage.

Advantages of the mixed seeding for pasture are that barley (Ward or Rogers) produces early pasture and a large total output; rye (Abruzzi or Balbo) provides good mid-winter grazing; winter oats (Cimarron, Forkedeer) have heavy total production with much of it coming in the spring; hairy vetch provides an abundance of spring grazing when moisture is available and may offer fall grazing if seeded early. A good mixture is 33 pounds of rye, 28 pounds of barley and 15 pounds of vetch.

Many farmers hesitate to seed rye and vetch on land which will be used for wheat in later years. One suggested solution is to plant pasture crops on the same land for three or four years, then prevent seed from maturing the last year the land is to be used for a pasture crop. This can be accomplished by using a spray on the vetch or plowing the crop under early enough in the spring of the last year.

Tests indicate that 100 pounds of superphosphate per acre on small grain pastures may frequently increase forage production from two to four times.

Returns from Various Crops Compared: Probably the most significant set of figures in Table II are those labeled returns to capital, labor and land. The superiority of wheat as a source of cash income is clearly indicated. This comparison indicates that oats and barley under recommended practices are very competitive, both being slightly below expected returns from alfalfa. The choice between oats, barley and alfalfa is largely a matter of individual preference, and facilities for handling the alternative crops. Naturally some site locations would be more suitable for the production of alfalfa than would others.

When the choice is to be made between growing oats and barley, consideration should be given to probable yields, year to year fluctuation in yields, and the possibility of the barley becoming a host plant for greenbugs and chinch bugs. Experimental results indicate that barley is no more variable in year to year yields than is oats and that it produces more winter pasture. For those farmers who have a particular need for a winter pasture in excess of that provided by winter oats and their normal seeding of wheat, barley deserves serious consideration. Some people are of the opinion that the role played by barley as a host for the insest pests which may damage adjacent crops has been overstated and that present insecticides can be used to nullify the adverse effects of this potential threat.

Agronomists have indicated that barley is more drought resistant than oats. An oats crop can be started on a very small amount of moisture but may die in droughts which follow. In years when moisture is

normal or better than normal, barley may be planted and early pasture expected.

The selection of the most profitable crops on the basis of the returns per acre of land plus the necessary capital and labor requirements implies that acres are the limiting factors in this area. This appears to be the case as most of the crop production involves the use of a great deal of mechanization with correspondingly low labor requirements. In those cases where capital is the limiting factor, greater emphasis should be given to that portion of the table indicating returns per dollar of capital invested.

Returns from Alternative Forage Crops Compared: Variable costs per acre yield, price per ton and gross value of the product are shown in Table III for alfalfa, oat hay, sudan hay, and forage sorghum as silage and as hay. These comparisons are made under assumptions of the continuation of present practices and with the use of recommended practices. Here alfalfa is superior to the other alternatives in gross value of the product per acre. This measure is not altogether adequate.

Returns to capital and labor of the operator offer a better measure for comparing these crop alternatives. Naturally the comparison between alfalfa and silage is valid only under conditions where there is a demand for silage at $7.50 a ton. Returns per dollar of variable cost also favor alfalfa with silage coming in second position. These assumptions appear to be valid, as much of the cost of harvesting these crops has been computed on a custom basis.

Grazing Out Small Grains: Grazing out small grains is an often considered alternative. Desirability of this practice may be evaluated on the basis of how return from grazing would compare with return from a grain crop. For simplicity it can be assumed that a mixed seeding, if released from grazing March 1, would produce grain equal to oats. If the expected yield was 35 bushels at 80 cents, the net return to fixed factors of production, after paying out-of-pocket harvesting costs at 84 cents per acre, would be $20.76 per acre.

Normally a seasonal price increase occurs for the quality of steers coming off small grain pasture March 1. By May this increase averages around 40 cents per hundred pounds. A 685-pound steer at $20.85 per hundred would have a value March 1 of $142.82. To compete with harvesting the grain as outlined above, the steer grazed on one acre would need to be worth $164.30 in May. At $21.25 per hundred this would indicate a 773-pound steer and a gain during March and April

of 88 pounds or almost a pound and one-half per day. Allowance for possible death loss to the animal at one percent of the expected value in May or $1.64 would increase the gain required to 96 pounds per head, over 1½ pounds per day.

Another alternative for the use of mixed seeding of small grains would be to buy thin 300-pound calves in February, if available, rather than 350-pound ones in May and thus save on the usual seasonal price increase. Thin calves weighing 300 pounds in February and costing $22.50 per hundred pounds when grazed on 0.6 acres each would pay at the rate of $21.25 per acre for this pasture if they gained 50 pounds and were worth $22.90 in May. These calculations allow for death loss of one percent on the expected May value.

Thus the $20.76 return from harvesting the grain is about the same as the expected return from carrying wheat pasture steers on to May or the $21.25 indicated from using this small grain to carry stocker calves during March and April.

Recommended Livestock Organization

Specific recommendations regarding types of livestock other than beef cattle have not been made. Often the emphasis or lack of it given milk cows, hens, sheep and/or hogs on wheat farms is dependent on personal preference, family labor supply and markets.

Changing the kind of cattle kept is the most important recommendation. Budgets which follow indicate the advantages of changing from a cow-calf operation to a calf-steer operation. For those who do not wish to abandon their stock cows entirely, an intermediate step with both cows and steers is shown.

The substitution of buying skill for breeding and calving skill should not be difficult especially since the services of highly skilled buyers are available at all the major livestock markets. Less medical skill probably would be required. This suggested adjustment to a calf-steer operation actually appears to require less management and technical ability. The change would tend to eliminate the practice of maintaining a breeding cow herd in a high level of condition through feeding alfalfa hay and using wheat pasture during much of the year. Greater income is realized when the wheat is pastured by young steers and the alfalfa hay is sold to dairymen.

Expenses would be reduced by following the recommendations in

that the steer system is much more flexible than is a cow-calf operation. To avoid disposing of high grade or registered cows to which many farmers become attached, feed is bought to carry through periods of short supply. The farmer who has no cows and plans to buy stocker calves only when he has pasture and forage in sight avoids this expense. He can also free himself from becoming dependent on native pastures and temporary pastures for summer use. He would buy only the number of steers in May which he can safely graze during the summer, keeping in mind that moderately used pastures are usually the most profitable. Native pastures not consumed during the growing season can be valuable when used in connection with wheat pasture. When there are adequate indications that there will be winter wheat pasture, the farmer can increase his cattle numbers by buying additional steers. Recommendations are that light steers (350 pounds) be bought in the spring and that those secured in the fall be heavier (500-600 pounds).

Calves bought in the spring could be expected to gain almost a pound per day from May through November from native pastures, stalk fields and early fall small grain pasture (wheat, barley, oats). Thus, they would weigh around 550 pounds by the end of November. Steers bought in the spring could be grazed on the native pasture at the rate of 9 acres per animal unit for the summer in contrast to the 4.5 acres per animal unit at which pastures are normally stocked for the summer in this area.[1] The purchase of additional 550 pound steers at the end of November should be scheduled for using the small grain pasture. With normal gains, they should weigh about 685 pounds by March 1, usually there would be some loss in price per pound for steers bought in May, but a gain for fall purchased animals.

Recommended Changes for an Individual Farm

Recommended changes in practices and organization have been evaluated by applying them to an individual 480-acre farm. Details are discussed here for (1) the present situation with organization and practices as they generally exist today, (2) the present organization with improved practices, and (3) an improved organization with improved practices. This sequence permits an identification of the effects of practices and organization changes on production, expenses and income.

The Present Organization and Practices: Production and sales are based on average yields and recent prices, Table IV. Under the as-

[1] Calculations based on reports in the 1954 Census of Agriculture of acres of pasture and cattle numbers by counties indicate that Alfalfa had 3.1 acres per head; Canadian, 3.8; Garfield, 3.3; Grant, 3.3; Kay, 3.6; Kingfisher, 3.7 and Noble, 4.5.

sumed situation, the crops could be expected to make a cash return of $5,660 above the cash costs directly resulting from crops. Likewise cattle would normally return $770 above direct cash inputs. These total $6,430, which is the return to family labor, management, land and other investments. The farm operator would have $6,430 to divide between family living costs, land rent, interest, taxes, machinery depreciation and replacement. Possible income from poultry, hogs, sheep, livestock other than cattle, from labor and machine work off the farm, government payments and miscellaneous sources would not be affected by adjustments and, therefore have not been included.

Present Organization with Improved Practices: The effects of improved practices on crops are shown in Table V. Here changes to recommended varieties, giving a little more care to crops other than wheat and the more general use of fertilizer are indicated to increase net farm income by $1,960 over the present situation.

Shifting from spring to fall seeded varieties of oats and barley would be a desirable adjustment where these crops are seeded in the spring. Those now seeding these crops in the fall could gain added advantage by seeding earlier (September or early October).

Recommended changes for cattle production practices would be minor and thus could be expected to affect income only slightly. Major changes recommended for cattle are of an organizational nature and changes in the kind of cattle kept. These recommendations are discussed in the following section.

Improved Practices and Organization: The total effects of improving crop production practices and improving organization of both crops and cattle are shown in Table VI. Improved crop practices are the most important, as they add $1,960 to income. Changing from stock cows to steers bought for pasturing within the grazing capacity of the native grass and wheat pasture add $1,144 to income. Gains from a change in the cropping system add $587. This comes from putting all the cultivated land above the wheat allotment into barley or oats.

Total effects of the suggested changes in crop production practices and reorganization of the cropping system and the livestock program amount to $3,691 per year. These figures have been assembled in brief form in Table VII. No indication of the present level of farm income is intended. For simplicity the calculation of net farm income has been avoided. These estimates simply indicate how the present net income, whatever its level, could be increased by more appropriate uses of resources now available.

Livestock Organization and Alternatives: Details of the inventory needed for the two alternative livestock systems and usual expenses and income items are shown in Table VIII. The middle column, a combination of half the cow herd and some steers, shows average expectations under normal conditions. The 7½ calves should be interpreted to indicate 7 or 8 calves. The one-half bull indicates that a farmer with only 8 cows might have a partnership bull. Rather than buy 1/3 or 1/6 of a bull each year, the farmer would actually buy a bull each third or sixth year.

Farmers may wish to change from cows to steers gradually and thus, feel out the reported advantages. This can be done by reducing cow numbers by culling and failing to keep replacement heifers to permit carrying a part of the calf crop on through the winter. If their own calves are in a high state of bloom at weaning time, they are likely to find it advantageous to sell these and buy high grade, thin calves. Capital requirements would be somewhat higher with the steer system, though not a serious hinderance to putting this plan into operation.

If the $3,000 now invested in cows were transferred into steers and the remainder borrowed for the period needed ($4,399 for 3 months) at 6 percent, the interest charges would be $66 for increased capital charges. Thus, shifting from cows to steers can be expected to increase total income to the farm by $1,000 or more. Difference in returns from the two systems have been budgeted for the years when wheat pasture is available. Differences would probably be as great or perhaps even greater in years of scant wheat pasture.

Without wheat pasture, the farmer with a cow herd would have increased expenditures for hay. The farmer with 20 steer calves bought in the spring would continue to carry them on through the winter in all probability, but would not acquire the additional 40 head unless wheat pasture prospects were good. Thus, he would be able to reduce his expenses somewhat proportional to his reduced income.

Rather than attempt to level out pasture production, as would be desirable with stock cows having rather constant season-to-season forage requirements, the recommended adjustments cause cattle numbers to conform to natural forage production schedules. Income is increased in two ways. First, net sales of beef are increased and second, expenses other than for the purchase of cattle are reduced. With the cow herd, expected net sales of cattle are $1,886 per year while steer sales of $8,569 reduced by $5,795 for steers bought and a $171 allowance for death loss still amounted to $2,603. Expenses for the cow herd, exclusive of bull

replacements amount to $1,016 while steer expenses other than for replacements total $689.

Effects of changing from stock cows to steers appear rather startling. These conclusions are, however, in agreement with results obtained in studies conducted at Fort Supply where these alternatives have been carefully compared.

Also the conclusions are in general agreement with experience of farmers in Garfield county who have kept farm business records for a number of years. An analysis of one of these farm records for a 19-year period, running through 1955, indicates that this particular farmer would have made an average of $215 more net income per year if he had kept no livestock on the farm.

The program on this farm consisted of growing wheat on most of the cropland and using the remainder to produce feed for the livestock. His livestock program included from 2 to 5 dairy cows, 12 to 20 high grade or purebred stock cows, a few hogs, most of the time, and poultry.

A similar analysis was made on another farm for which records were available for 25 years, through 1956. The second farmer had an average of 8 dairy cows and 3 beef cows. Otherwise these farms were very similar. This farmer realized an average of $134 additional net income per year as a result of keeping livestock.

Analysis of actual records of these two individual farms were made assuming no change in production practices or yields. The comparison simply emphasizes the importance of the correct organization and lends support to the reasonableness of increased income estimates made on the basis of improving both production practices and organizations.

Summary and Conclusions

This study was designed to provide data for farmers to use when making resource adjustments in north central Oklahoma. Reallocations have been made necessary by acreage restrictions on wheat, the most profitable crop in the area. Decisions are required on crop land uses, crop practices and livestock organization and practices.

Use of Crop Land

Winter growing crops have a decided advantage over summer growing crops in the area studied. Thus, oats and/or barley are the

more profitable crops with which to replace wheat. Experimental results indicate that barley outproduces oats. This advantage should be carefully weighed, however. Barley may provide a nursery for greenbugs and chinch bugs which could infest nearby fields of wheat and other crops.

While increased seedings of alfalfa may be warranted on soils with permeable subsoils, the present acreage of alfalfa on the heavier soils should probably be reduced because winter growing crops can be expected to make a greater return. Grain sorghums and forage crops are also less profitable land uses than barley or oats.

Crop Practices

The level of practices now being used on crops is excellent. However, a few significant changes are recommended. Shifting from spring to fall seeded oats and barley would increase yields. This would require changing varieties to Cimarron or Forkedeer oats and to Harbine or Rogers barley. The additional practice of applying 100 pounds of 0-20-0 fertilizer also adds to yields. The two major recommendations can be expected to increase oat yields about 14 bushels and barley yields about 7 bushels.

Wheat should also have an application of 100 pounds of 0-20-0 fertilizer. A yield increase of 2 bushels would be expected on the average.

Livestock Organization and Practices

Basically the livestock program on the farms consists of a herd of high-grade or purebred beef cows which usually calve in the spring. Calves are sold either at weaning time in the fall or when taken off wheat pasture the following spring. While the system has much to offer the farmer in terms of pride of ownership and production of good animals, it does not fit well with his resources. The continuation of this system does not appear to be justified in terms of net money return.

Shortcomings of this system are that it is not flexible enough to allow for seasonal or between year fluctuation in available feed supplies, it does not conform to the usual seasonal forage production schedule of farms in the area and it tends to be an inefficient method of utilizing the quality of forage found on the farms. The latter shortcoming refers

to differences in value of gains from a given acreage of small grain pasture when utilized by a cow herd rather than by stockers or feeders. Under the present farming system, farmers often plant summer pasture and feed hay or other forage in late summer. In years of scant wheat pasture, they have too many cattle and in years of abundant pasture they have too few to effectively utilize the available winter pasture.

Budgets in this bulletin indicate that farmers could increase their net returns substantially by replacing the cow-calf project with a stocker program. A less drastic change, involving replacing only part of the cow-calf herd would also increase profits. Under either of these adjustments the increase in income would be primarily a result of matching cattle numbers to feed supplies. The recommended plan is to buy light stockers or feeders in November and sell them off small grain pasture in the spring. Numbers purchased would depend on winter pasture expectations.

TABLE I. Present Typical Land Use and Livestock Systems for a 480-Acre Farm on Kirkland-Renfrow Type Soils of the North Central Oklahoma[1] Wheat Producing Area. (1956)

Crops	Acres	Yield/Acre	Total Production	Amount Used on Farm	Amount Sold
Wheat	216	15 bu.	3240 bu.		3240 bu.
Oats	90	21 bu.	1890 bu.	72 bu.[2]	1818 bu.
Sorghum:					
Grain	20	14 bu.	280 bu.	110 bu.[3]	170 bu.
Forage	13	1.5 ton	19.5 ton	19.5 ton[4]	—
Alfalfa	21	1.2 ton	25.2 ton	25.2 ton[4]	—
Total	360				

Livestock	Number	Animal Units	Products Sold	Amount Sold
Beef type cows	16	16	3 culls (900 lbs.)	2700 lbs.
Beef type bull	1	1	Avg. of 1/3 cull each year	400 lbs.
Relpacement heifers	4	2	Avg. of 1/2 cull each year	400 lbs.
Calves—1 year	15	5	11 yearlings (600 lbs.)	6600 lbs.
Total	36	24		

[1] See Figure I.
[2] 39 bu. hens, 13 bu. chicks, 20 bu. milk cow.
[3] 45 bu. hens, 15 bu. chicks, 50 bu. hogs.
[4] Small amount of feed not required for cattle is used for bedding litter, milk cow, etc.

TABLE II. Estimated Costs, Yields and Returns with Present Practices and with Proposed Practices for One Acre of Alternative Cash Crops in North Central Oklahoma

	Wheat		Oats			Barley		Alfalfa		Grain Sorghum	
	Present	Proposed	Present	Proposed Fall:	Proposed Spring	Present	Proposed	Present	Proposed	Present	Proposed
Variable cost per acre	5.18	6.95	4.82	6.61	6.61	5.21	7.01	10.80	13.51	3.25	3.09
Yield per acre	15	17	21	35	27	19	26	1.2	1.6	14	17
Assumed Price per bu. or ton	1.85	1.85	.80	.80	.80	1.09	1.09	25.00	25.00	1.22	1.22
Total Sales	27.75	31.45	16.80	28.00	22.40	20.71	28.34	30.00	40.00	17.03	20.74
Rent Paid (1/3 of production)	9.25	9.90	5.60	8.75	6.62	6.90	8.87	7.12	7.88	5.69	6.91
Return to capital and labor of operator	13.32	14.60	6.38	12.62	8.37	8.60	12.46	12.08	13.61	8.14	10.74
Return to capital, labor of the operator and land	22.57	24.50	11.98	21.39	14.99	15.50	21.33	19.20	21.49	13.83	17.65
Return per $1 of Variable cost	5.36	4.52	3.48	4.24	3.39	3.98	4.04	2.78	2.16	5.26	6.71

TABLE III. Estimated Costs, Yields and Returns with Present Practices and with Proposed Practices for One Acre of Alternative Forage Crops in North Central Oklahoma

	Alfalfa		Forage Sorghum				Oat Hay	Sudan Hay
			Silage		Hay			
	Present	Proposed	Present	Proposed	Present	Proposed	Proposed	Proposed
Variable Cost per Acre	10.80	18.51	17.39	16.48	12.93	13.53	16.56	14.38
Yield per Acre	1.2	1.6	5	5	1.5	1.6	1.5	1.6
Assumed Price per Ton	25.00	25.00	7.50	7.50	17.00	17.00	15.00	17.00
Gross values of production	30.00	40.00	37.50	37.50	25.50	27.20	22.50	27.20
Return to capital, labor of operator and land	19.20	21.49	20.11	21.02	12.57	13.67	6.00	12.82
Return per $1 of variable cost	$2.78	$2.16	$2.16	$2.28	$1.97	$2.01	$1.36	$1.89

TABLE IV. The Present Situation; Production, Sales and Variable Costs for a Typical Farm

	Acres	Production	Sales		Variable Costs
			Amount	Dollars	
Crops:					
Wheat	216	3240 bu.	3240 bu.	$5,994	$1,106
Oats	90	1890 bu.	1818 bu.	1,454	430
Grain sorghum	20	280 bu.	170	207	64
Alfalfa	21	25.2 tons	———	———	227
Sorghum forage	13	19.5 tons	———	———	168
Total from crops	360			7,655	1,995
Crop Sales less variable costs				5,660	
Cattle:					
Culls				510	
Feeder steers				1,376	
Animals bought					100
Feed (hay)					948
Drugs, minerals					23
Hauling, commissions					45
Total cattle sales and costs				1,886	1,116
Cattle sales less variable costs				770	
Total crops and cattle sales less variable costs				$6,430[1]	

[1] This is not net farm income as these calculations have been made without regard to fixed costs. This is the amount available for farm family living, taxes, interest, rent, debt payment, depreciation, etc.

TABLE V. Expected Production, Sales and Variable Costs with Present Organization and Improved Production Practices.

	Acres	Production	Sales		Variable Costs
			Amount	Dollars	
Crops:					
Wheat	216	3672 bu.	3672 bu.	$6,793	$1,486
Oats	90	3150 bu.	3078 bu.	2,464	590
Grain sorghum	20	391 bu.	281 bu.	343	69
Alfalfa	21	33.6 tons	25.1 tons	640	389
Sorghum forage	13	16.0 tons	3.0 tons	51	135
Total from crops	360			$10,289	$2,669
Sales less variable costs				$7,620	
Increased income from improved crop production				$1,960	

Cattle: Same as "Present Situation", Table IV, as cattle practice changes would be minor. Effects of changing the cattle organization are shown in the Table VI.

TABLE VI. Expected Production, Sales, and Variable Costs with Improved Production Practices and Improved Organization

	Acres	Production	Sales Amount	Sales Dollars	Variable Costs
Crops:					
Wheat	216	3,672 bu.	3,672 bu.	$6,793	$1,486
Barley or	144	3,744 bu.	3,574 bu.	3,895	995
Oats[1]	(144)	(5,040) bu.	(4,785) bu.	(3,828)	(944)
Total from crops	360			10,688	2,481
Sales less variable costs				8,207	
Sales less variable costs, present situation				5,660	
Increased income from improved practices				1,960	
Increased income from improved crop organization				$ 587	
Cattle:					
Stocker steers			60	8,569	——
Feeder steers			60	——	5,795
Feed (hay)					236
Drugs, minerals					33
Hauling, commissions					420
Death loss allowance (2 percent of sales)					171
Total for cattle				$8,569	6,655
Sales less variable costs				1,914	
Sales less variable costs, present situation				770	
Increased income from improved cattle organization				1,144	
Total increase to farm				$3,691	

[1] Returns in this table are obtained by assuming barley is used in the plan. If a farmer prefers oats, he may compute returns using figures in the oats row.

TABLE VII. Additions to Net Farm Income from Suggested Changes (Sales Less Variable Costs from Enterprises Studied).

	Crops	Cattle	Total
Present situation	$5,660	$ 770	$6,430
Gain from improved organization	1,960	----	1,960
Gain from improved practices	587	1,144	1,731
Gain from improved practices and organization	2,547	1,144	3,691
Increase, percent of present	45	149	57

TABLE VIII. A Comparison of Three Methods of Producing Beef Cattle.

	Cow-Calf (only)		Combination		Steers (only)	
	No.	Value	No.	Value	No.	Value
Inventory						
Cows	16	$2160	8	$1080	—	—
Heifers (replacement)	4	540	2	270	—	—
Calves	15	900	7½	450	—	—
Bulls	1	300	½	150	—	—
Steers, May to March	—	—	—	—	20	1604
Steers, December to March	—	—	40	4191	40	4191
Average A. U. per year	24	—	18	—	15	—
Average investment in cattle	12 mo	3000	9 mo 3 mo	1500 5691	7 mo 3 mo	1604 5795
Sales per year						
Cows, cull		370		185		—
Heifer, cull		74		37		—
Bull (change each third year)		66		33		—
Feeders-raised		1376		688		—
Feeders-bought		—		5713		8569
Total Sales		1886		6656		8569
Expenses per year						
Steers bought	—	—	40	4191	60	5795
Bull (each 3 years)	⅓	100	1/6	50	—	—
Death loss	—	—	2 percent	114	2 percent	171
Minerals, medical		23		33		33
Hauling, commissions		45		304		420
Alfalfa hay, tons	25	625	8	200	4	100
Sorghum, forage, tons	19	323	13	221	8	136
Total Expenses		1,116		5113		6655
Returns (to Labor, Land, Investment)		$770		1543		1914
Interest on added investment		—		63		66
Increased return to Labor and Land		—		$ 710		$1078
Increased return to Labor, Land and Capital				$ 773		$1144