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Dual-Purpose Wheat Systems for Grazing and Grain or Hay Production in Arkansas

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Introduction

Arkansas produced an average of 782,000 calves annually from 2006 to 2015. Since there is no major beef packing industry in Arkansas, the majority of these calves leave the state for finishing. Wheat grazing is a historical practice among states along Arkansas' western border, and many cattle weaned and marketed in Arkansas in the fall end up as wheat stockers before feedlot entry.

Arkansas producers planted an average of 553,000 acres of wheat annually from 2006 to 2015. However, there is a geographical division among crop-producing and livestock-producing areas within the state. Wheat, as a forage crop, is capable of adding value to calves after weaning and prior to feedlot entry, and contract grazing is a possible mechanism for adding value to a wheat crop. Therefore, Arkansas cattle producers, through retained ownership, and wheat producers, through contract grazing, should explore the opportunity to capture this added value for both enterprises within the state.

Little information is known about the impact of grazing soft winter wheat varieties planted on Arkansas soils. This fact sheet discusses the observed impact of grazing on wheat grain yield and common issues that must be addressed when planning a dual-purpose wheat grazing-grain system.

Grazing and Grain Yield

In 1996 and 1997, research was conducted at the Livestock and Forestry Research Station (LFRS), near Batesville, Arkansas, to examine the weight gain response of calves and grain yield of grazed wheat, planted in September. The wheat was on a Peridge silt loam soil. Calves gained over 2 lbs/day at stocking densities of 500 and 750 lbs/acre liveweight in the fall and during spring graze-out. Calves were removed from the wheat in February so wheat could develop for grain harvest. The observed wheat yield with grazing was 43 bu/acre. Wheat grain yield was significantly greater for wheat grazed during fall and winter compared to nongrazed wheat, because the advanced maturity of the early-planted (September) non-grazed wheat made it susceptible to freeze damage.

From 2005 through 2008, grain production following grazing was evaluated across the state at on-farm demonstration sites. These sites consisted of silt loam and fine sandy loam soil types. At three sites, grain yield of wheat grazed was reduced by 9 percent from an average of 42 to 38 bu/acre. If wheat grain is valued at $5.50/bushel, net returns from wheat grain following grazing should provide more than $22/acre to offset the 4-bushel yield reduction.

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Planning for Wheat Grazing

The following bullet points outline some common management observations that should be considered when planning a dual-purpose grazing-grain wheat system.

- **Planting Date and Method** – The impact of grazing on grain harvest from wheat established in a clean-till seedbed has not been evaluated in Arkansas. However, grazing clean, minimum and no-till planting methods have been compared for grazing only. In general, no-till methods allowed earlier fall grazing when the fall season had abundant rainfall. For grazing, a chemical fallow during summer followed by no-till establishment in September was shown to be the most economical establishment method. Aerial overseeding of wheat into a soybean crop was observed at one demonstration site. This practice was intended as a grazing/cover crop and not for grain harvest. In two out of three years, dry weather caused establishment failure resulting in wheat being replanted. As a result, this practice may not be economical with purchased seed. Ground preparation and planting should be completed before the end of September unless wheat is being planted behind a grain crop. Soil samples should be taken prior to ground preparation to ensure recommendations are obtained in time to fertilize accordingly. Apply the fertilizer early; don't hold off for a rain. Waiting usually results in a missed opportunity for forage growth. Wheat has been successfully established each year at the LFRS since the mid-1990s following this planting and fertilization strategy.

- **Effect of Stocking Rate on Animal Performance** – Wheat forage in the fall and winter is very high in crude protein and digestibility. Based on the high forage quality, calves grazing wheat would be expected to gain in excess of 3 lbs/day, but actual gains are typically 2 to 2.5 lbs/day. Less than expected gains are often due to limitations in forage dry matter availability, which can limit intake, thus reducing gains. This relationship between forage availability and animal performance highlights the importance of managing the stocking rate of grazing calves on wheat pasture. Stocking rates of calves on wheat pasture must be managed so that adequate forage is available to meet animal performance goals. Research on calves grazing wheat pasture established by no-till, reduced tillage or conventional methods had been conducted at the LFRS for several years. The pastures were stocked at 0.75, 1 and 1.5 calves per acre (500-lb calves) from early November to late February. In no-till wheat pastures, calf average daily gain was reduced from 2.9 lbs/day at the low stocking rate to 2 lbs/day at the high stocking rate. At the high stocking rate, daily gains were reduced to 1.8 or 1.6 lbs/day when pastures were established by conventional or reduced tillage, respectively. Available forage in these pastures was reduced from 3,500 to 1,000 lbs of forage dry matter per calf with increased stocking densities. Research conducted in Oklahoma and Texas indicates that the cutoff for maximum animal performance is 1,200 to 1,500 lbs of forage dry matter per calf.

Figure 1. Calves turned out to wheat pasture before adequate stand development.

- **Fertilization** – Inadequate fertilization can result in less forage being produced, over-grazing and reduced grain yields. A common observation among wheat grazing demonstration sites was their differences in soil nutrient analysis results, which verifies that there is no one-size-fits-all solution to fertilization recommendation. Some sites required only nitrogen fertilization because levels of phosphorus and potassium were at or above the recommended level; however, other sites were adequate in phosphorus but very low in potassium along with some instances of low soil pH. Be sure to apply the amount of nitrogen to support the system and production level

required. Both fall and spring nitrogen applications are not options but necessities for dual systems. Residual nitrogen from legume crops may not be available quickly enough in the fall to produce enough wheat forage for fall grazing. An up-to-date soil test is important in order to avoid the purchase of unnecessary nutrients as well as apply the correct amount of nutrients.

- **Weed Control** – Weed control in a dual-purpose system requires pre-planning. One of the major contaminates observed in on-farm dual-purpose wheat demonstrations was ryegrass. Consult with a county Extension agent about ryegrass control and other weed issues early, because herbicide grazing restrictions will dictate if and when cattle can graze and may also affect crop rotation.

Figure 2. Area right of the center post shows heavy ryegrass contamination while the area to the left was controlled with herbicide, planning for grazing restrictions.

- **Removal of Cattle for Production of a Grain Crop** – Dual-purpose wheat requires a high level of management to minimize grazing effects on grain yield and maximize net income. Grazing must be terminated before the wheat plants develop the first hollow stem. As soon as wheat begins its first flush of growth in late winter or early spring, start examining plants to determine if the wheat has reached the "first hollow stem" stage. The first hollow stem is the growth stage where the growing point of the wheat plant appears above the crown and jointing is soon to follow. This stage occurs as the wheat switches from the vegetative stage to the reproductive stage of growth. When the leaf sheaths become strongly erect, new tiller initiation effectively stops and the growing point, which is below the soil surface, will soon begin to develop a tiny head. Although the head is quite small at this point, it has already established some important yield components. Research in Oklahoma indicates that for each day livestock are grazed past this growth stage, grain yield will be reduced 0.15 to 0.2 bu/acre. A one-week delay in grazing termination will result in grain yield reductions of 1 bu/acre, and a two-week delay will result in a reduction of up to 3 bu/acre.

Figure 3. Area right of the white line was never grazed. Area to the left was exposed to grazing from November through mid-February. Area outside the cage continued to be grazed until April.

- **Removing Cattle for a Stored Forage Crop** – Small grains can make an excellent, high-yielding hay or haylage crop when harvested at the right plant maturity. Two on-farm demonstrations were conducted to determine the effect of grazing on wheat plant yield and forage quality. In one demonstration, the grazed wheat yielded 942 lbs/acre less forage than the nongrazed wheat. From the first of April to mid-April, forage yield increased from 2,500 to 5,000 lbs/acre. Thereafter, the growth rate slowed, and from mid- to late April, yield increased an additional 1,000 lbs/acre. During this time, crude protein decreased 0.5 percentage units per day from 25 to 14 percent of dry matter. Interestingly, in early April the TDN of the grazed wheat was initially

higher than that of the nongrazed wheat, but by the end of April, TDN values were similar regardless of grazing. From mid- to late April, TDN was 64 and 58 percent, which is a desirable range for lactating beef cows. In the second demonstration, delaying harvest until the soft dough stage of maturity was compared to harvesting at anthesis. Delaying harvest increased yield by 2,300 lbs/acre. The digestibility of the forage at soft dough was greater than the digestibility measured at anthesis. This was associated with the energy content of the filled grain offsetting the lower digestibility of the fibrous plant leaves and stems. Delaying harvest to this growth stage has the potential to increase yields and sustain quality; however, if harvest management results in shattering the grain from the heads, quality will be lost. Grazing reduced yields by approximately 1,045 pounds, similar to the first demonstration.

Summary

- When budgeting wheat grazing on grain yield losses, use a 10 percent reduction in grain yield if wheat is grazed up to first hollow stem.
- Plan early for any grazing restrictions of herbicides used to control weeds for wheat intended to be harvested after grazing.
- No-till planting methods are most economical compared to clean-till and reduced tillage for wheat planted as a forage-only crop.
- Use an up-to-date soil test for fertilization recommendations.
- Do not turn cattle out too early or over-stock fields in the fall!
- Grazing will reduce yield of wheat to be harvested as a stored forage but has little impact on quality by common harvest stages.

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