A GRAZING AND HAYING SYSTEM WITH WINTER ANNUAL GRASSES

Steve Orloff and Dan Drake[1]

ABSTRACT

Forage to graze is not available for much of the year in the Intermountain Region and producers are forced to feed costly hay. A forage-production system that would prolong the grazing season (later in the fall and earlier in the spring) would be very beneficial. Field trials with winter annual grasses (wheat, barley, triticale and annual ryegrass) were conducted to evaluate their potential for fall and spring grazing plus a subsequent hay cutting. Triticale (var Trical 102) produced the highest yield (dry matter yield for grazing of approximately 0.5 tons/A in fall and 2.5 tons/A in spring, followed by a 4 to 6 ton cutting of hay). Fall yields were highly dependent on date of planting with early planting dates resulting in significantly more forage. Hay yield increased with advancing plant maturity but quality declined—triticale harvest at early heading to flowering provided the best compromise between yield and quality for beef cows. These trials demonstrate that winter annual grasses can provide high quality grazable forage for beef cattle at a cost significantly below hay feeding in the intermountain area. Additional trials on date of planting, fertilization, regional adaptation, varieties, and grazing management systems are currently underway to provide additional information about this new production system.

Key Words: Small grains, cereal forages, triticale, economics, forage systems

INTRODUCTION

Winter-feeding is one of the most costly inputs in a cattle operation. Therefore, cattle producers wish to limit the amount of time they feed hay. Most ranchers rely on irrigated pastures for grazing. Irrigated pastures in the intermountain area are composed of cool-season perennial grasses and legumes, typically tall fescue and white clover. Unfortunately, climate in the Intermountain Region limits pasture production from late fall through early spring (Figure 1). Ordinarily, pasture growth is significantly reduced or ceases by November or earlier. Fall grazing of crop aftermath occurs to a limited extent during this time of year. However, the quantity is limited and quality declines as the fall progresses. Most ranchers don't initiate grazing of irrigated pastures until at least mid April. Therefore, there is a significant time period (November to mid April or later) when there is insufficient good-quality forage to graze and growers are forced to feed hay.

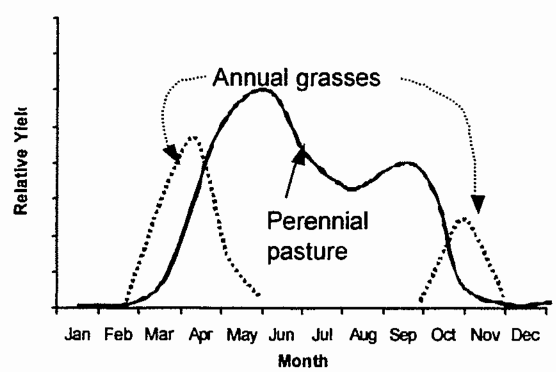


Figure 1. Estimated growth pattern of irrigated pasture and winter-growing annual grass in the Intermountain area of California.

[1] S. Orloff and D. Drake, Crops and Livestock Farm Advisors, UC Cooperative Extension 1655 S. Main St., Yreka, CA 96097.

GRAZING WINTER GRASSES

It is common in other areas of the U.S., particularly the High Plains, to graze cereals during the winter. Until recently, this practice was rarely, if ever, done in the intermountain area or any of the West. In the intermountain area, it is common to plant cereals in the fall or early spring as a rotation crop between alfalfa plantings. Cereals are grown for grain or hay but traditionally are not grazed. A series of field trials were conducted over the past several years to determine if winter annual forage grasses could be used to extend the grazing period in the fall, allow for early spring grazing (see Figure 1), and still provide hay production. It was unknown how the winter forage grasses would tolerate grazing and how fall and early spring grazing would affect subsequent forage hay yield. Subsequent trials were conducted to determine the effect of planting date on fall forage yield and to evaluate the yield quality relationship for the hay harvest to determine the optimum harvest time.

Initial field studies were conducted with a grower cooperator, the Bryan Ranch, in Scott Valley Siskiyou County. In the first studies five different forage grasses were evaluated: two forage triticale varieties, Trit 2700 (an intermediate winter-hardy type), Trical 102 (a winter-hardy type), Yamhill winter wheat, a hooded barley (commonly called beardless barley), and annual ryegrass. There were four grazing treatments: grazed in the fall, grazed in the spring, spring and fall grazed, and not grazed. The trial was conducted over three years.

A portion of each plot was hand-mowed prior to grazing to estimate the amount of forage available to the cows at the start of the grazing periods. The cows were then brought in and the remainder of the plot grazed. An electric fence was used to exclude the cows from plots we did not want grazed. Following the grazing treatments, each plot was allowed to regrow. A portion of each plot was harvested when the annual grass reached the boot stage and another area when it reached the soft dough stage.

Fall Forage and Planting Date Effects

The amount of forage available for grazing depended on the species, planting date and date of grazing. In general, the less dormant annual grasses (Trit 2700 and spring beardless barley) tended to yield slightly more in fall (data not shown). The amount of fall forage was much more affected by the planting date and initial grazing date than the grass species. The amount of forage available for fall grazing ranged from 614 pounds to nearly 2000 pounds per acre depending on the year and the combination of planting date and grazing date (see figure 2). This emphasizes the importance of early planting for increased fall production.

The apparent strong influence of planting date on fall yield led us to conduct an additional trial to further investigate the effect of planting date. This is an ongoing trial currently in its second year. We evaluated five different planting dates—the first in mid July and then every two weeks up to September 15. The results to date indicate that the optimum planting date is early to mid August. There was a dramatic reduction in fall forage with later planting dates. The yield plateaued with the earliest planting dates, July 15th and August 1st, and was not significantly higher than the mid-August yield.

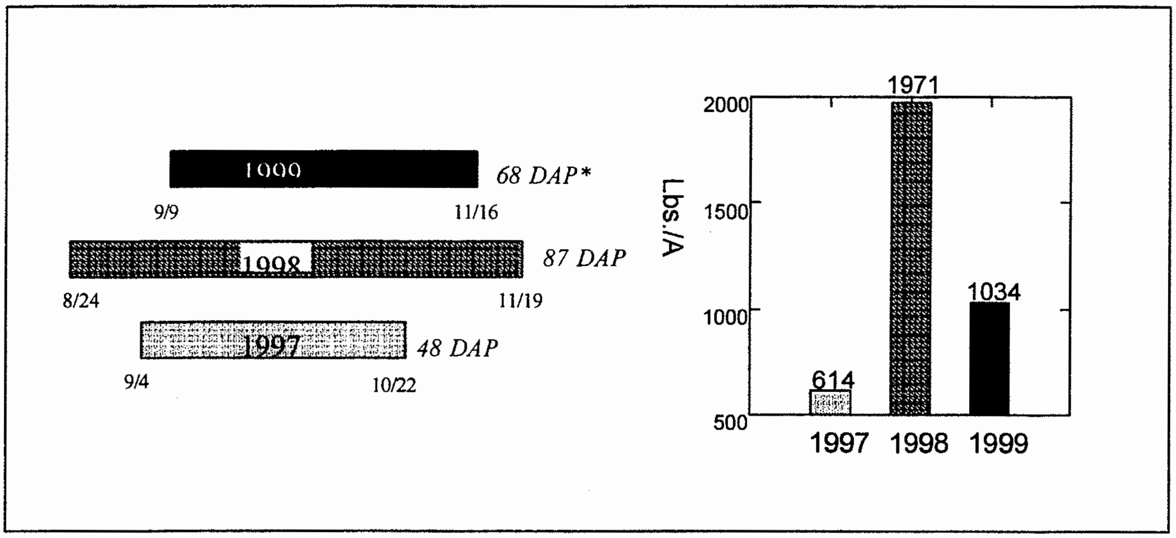
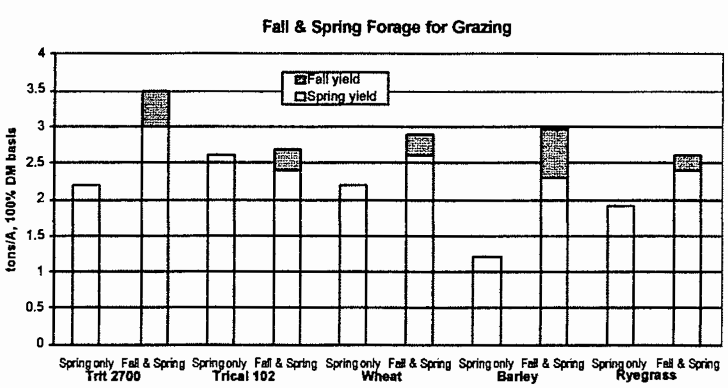


Figure 2. The effect of the planting date and grazing date combination used each year on the amount of fall forage available for grazing for Trical 102. (*DAP = days after planting)

Forage For Spring Grazing

There was even more forage available for spring grazing (about 2 – 2.5) tons/A) than in the fall. These annual forage grasses resume growth earlier after winter than do perennial grasses and appear to have a more rapid growth rate. Fall grazing did not have a large effect on the amount of spring growth. In 1998 fall grazing resulted in a slight increase in spring yield and in 2000 there was a slight decrease. Spring forage available for grazing was measured on 4/10/98 (Figure 3). The amount of spring forage in plots that were fall grazed ranged from 2.3 to 3.1 tons per acre with Trit 2700 producing the most and beardless barley the least (there was significant winter kill of the spring beardless barley so we switched to a winter type in subsequesnt years). Although Trit 2700 survived in 1998, it should be noted that Trit 2700 has winter killed two out of four trial years. Therefore, it is generally not recommended for the intermountain area, except perhaps when it is blended with Trical 102. Crude protein of spring-grazed forage was 15 to 17 percent, which is much higher than the crude protein requirements of beef cattle.

Figure 3. Fall and spring forage, tons per acre 100 percent dry matter basis, available at the start of grazing periods (1998 results).



Yield and Quality of Boot Stage Harvest for Hay

There were large differences in boot-stage yield between annual grasses. The yield for fall grazing, spring grazing and boot harvested hay are shown (Figure 4). In 1998 fall grazing significantly increased the boot-stage yield of all annual grasses (3.0 compared to 4.3 tons per acre). Fall grazing is believed to be beneficial because it reduced the amount of winter cover thereby lessening the meadow mice damage. It is also believed that fall grazing increased tillering of the annual grasses. Fall grazing dramatically improved the winter survival of the spring beardless barley. There was significantly more winter kill in the barley plots that were not fall grazed compared to the grazed plots. Figure 4 shows the yield in tons per acre (100 percent dry matter basis) for 4 grazing treatments. Each bar shows yield of hay harvested at the boot stage, and when appropriate, the amount of forage available for fall and/or spring grazing.

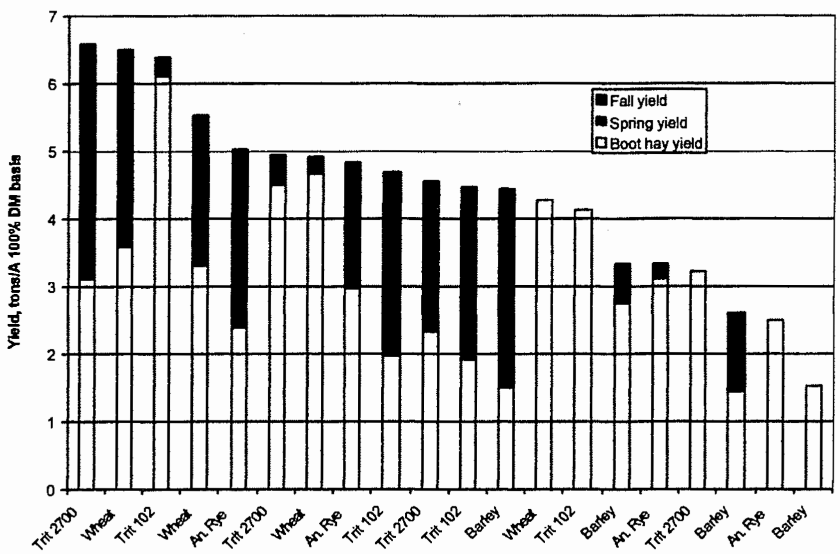


Figure 4. Total forage yield of different grass species for fall grazed, spring grazed and hay yield when simulated hay harvest is made at boot stage.

Quality of boot-harvested hay is shown (Figure 5). When harvested at the boot stage, most of the cereal hays are adequate for dry beef cows and average beef cows with calves. For cows with better than average milk production cereal hays would have to be supplemented.

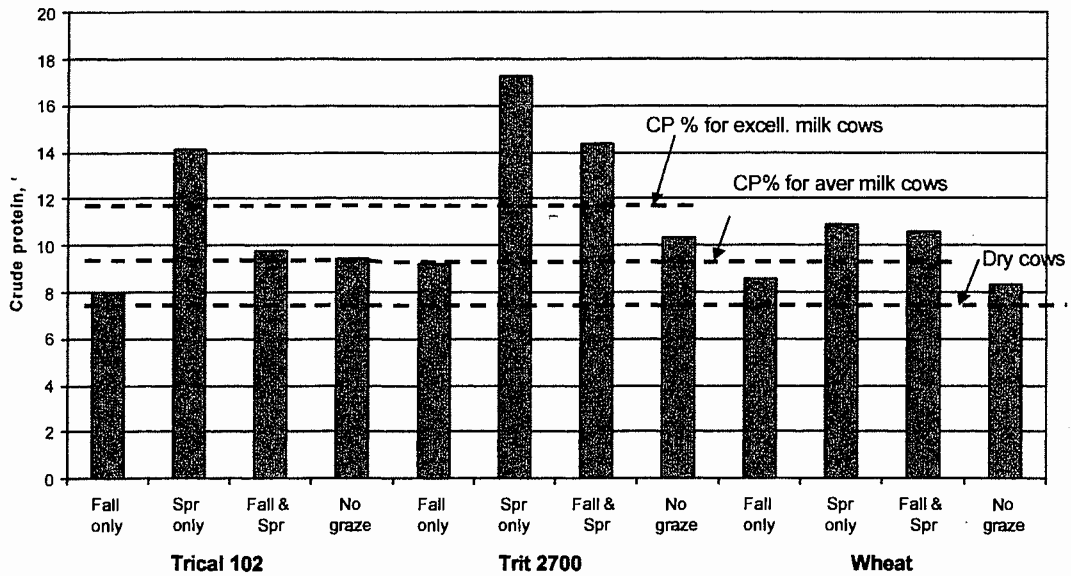


Figure 5. Cow crude protein requirements and crude protein, percent, in Trical 102, Trit 2700 and Yamhill wheat for various grazing treatments.

Yield and Quality of Soft Dough Stage Harvest for Hay

Yield of soft dough-harvested hay is shown for each species by grazing treatment (Figure 6). A pattern similar to the boot stage harvest is seen. However, yield is significantly higher than at

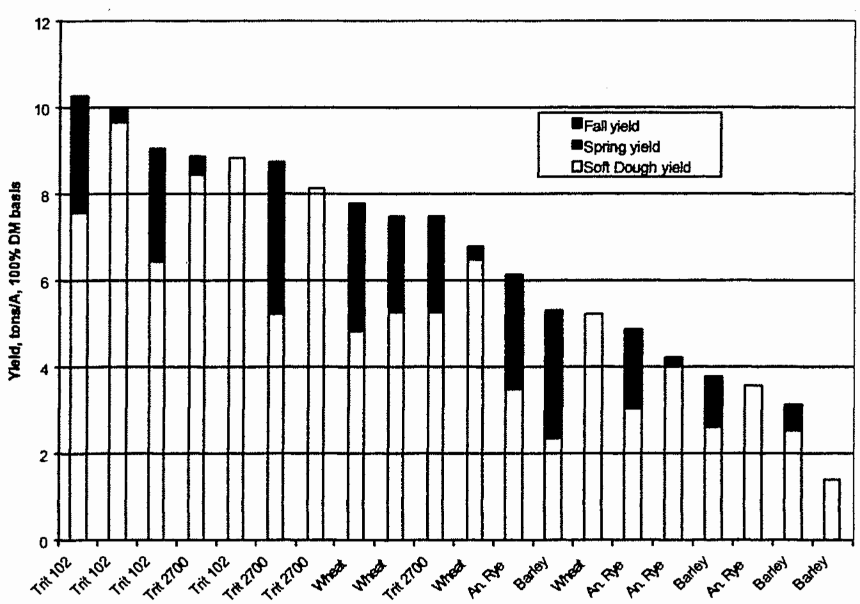


Figure 6. Total forage yield of different grass species for fall grazed, spring grazed and hay yield when simulated hay harvest is made at the soft dough stage.

boot stage. The increase in wheat hay from boot to soft dough was about 20 percent. In contrast, Trical 102 doubled in yield from boot to soft dough. However, the increase in yield by waiting to harvest at soft dough results in unacceptable quality for many livestock classes (Table 1). When harvested at soft dough, the crude protein of most winter cereals is below that required for dry beef cows

Table 1. Crude protein and total digestible nutrients (TDN) for winter-growing cereal hay averaged for four grazing treatments, fall grazing, spring grazing, fall and spring grazing, and no grazing, harvested at either boot or soft dough stage. TDN values estimated from acid detergent fiber (ADF) content. All values 100 percent dry matter basis.

	Boot Harvested Hay		*Soft Dough Harvested Hay*	
	Crude protein, %	**TDN, %**	**Crude protein, %**	**TDN, %**
Trit 2700	12.8	60.6	6.7	59.3
Trical 102	10.3	60.0	6.1	59.3
Wheat	9.6	61.0	7.3	60.7
Barley	12.3	62.3	Na	Na
An. Ryegrass	12.0	62.4	8.3	59.3

Because of concerns about acceptable forage quality, an additional trial was conducted to determine the effect of hay harvest date on yield and forage quality. Trical 102 was harvested at predetermined intervals after the spring grazing. It was found that yield continued to increase as harvest was delayed to the soft dough stage. Acceptable yield and quality occurred at the early heading to flowering stage (see figure 7).

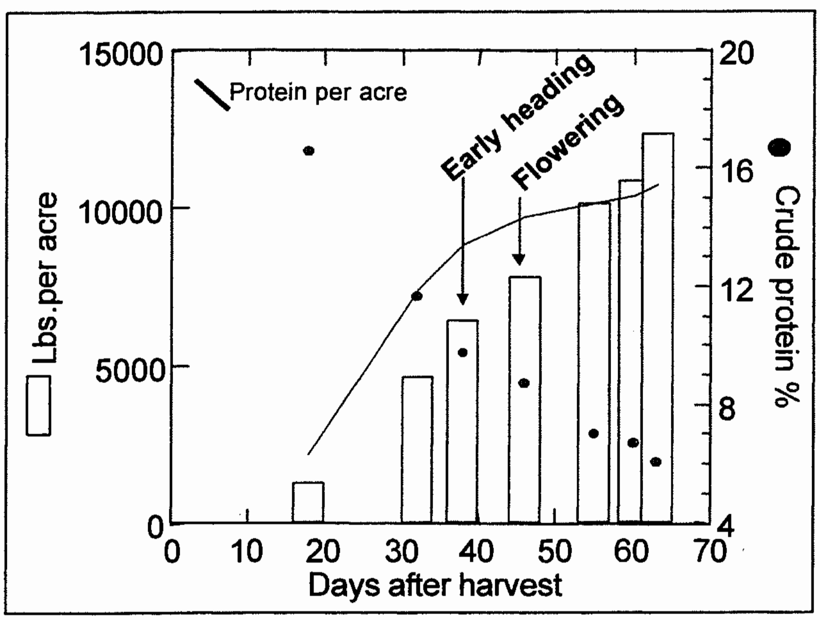


Figure 7. The effect of days after grazing (harvest) on the yield (lbs./A), crude protein (%), and protein per acre.

ONGOING RESEARCH

This annual pasture/haying system using winter annual grasses has significant promise. Several additional research studies are ongoing to better understand the flexibility of the system and to fine-tune the program. Currently studies are underway in counties throughout the intermountain area to evaluate the feasibility of this system under different environmental conditions. In addition planting date research is continuing to determine not only the effect of planting date on fall yield but also the subsequent spring grazing and hay yield. Another study was just initiated to simulate grazing management systems to determine optimum grazing timing and duration (i.e., continuous vs. rotational grazing and to quantify the effect of grazing, especially late grazing, on the subsequent hay yield). Initial field research has suggested that planting triticale and ryegrass in combination may lengthen the grazing season, improve the trampling tolerance of the annual pasture, and improve palatability. Research is currently underway to evaluate different ryegrass varieties alone and in combination with triticale. While most winter cereals will work for this grazing/haying system, triticale (var. Trical 102) seems especially well adapted due to its rapid spring growth, high yield, and disease resistance. Trical 102 is awnletted and has met with some resistance in the retail feed store market. Variety evaluation is ongoing to acquire an awnless variety and a variety that better maintains its forage quality at more mature growth stages. Triticale has been observed to be extremely nitrogen responsive. Nitrogen fertilization studies are being conducted to determine the proper nitrogen fertilizer rate and timing for most profitable yield.

SUMMARY

These field trial results clearly demonstrate the benefits of using winter annual grasses to extend the grazing period and for hay production. Initial grower experience has been extremely encouraging as well. Winter annual grasses compliment perennial pastures and provide late-fall and early-spring feed that can shorten the hay-feeding period. After grazing the field twice (once in fall and once in spring) the growers can still make a hay harvest that is comparable to typical yields for spring-seeded cereals (i.e., oats or beardless barley or wheat). The fall forage yield varies with planting date but half a ton is easily obtainable. Forage yield for spring grazing is typically over 2 tons. Using the proper planting date, grazing time(s) and management, total seasonal forage yields in excess of 7 to 8 tons per acre are achievable under most conditions. This production system may require some additional inputs to satisfy the livestock watering requirement and fencing requirement as well as higher than usual nitrogen fertilization rates. However, we believe the potential benefits far exceed any added requirements. Since forage inputs are typically the most costly input for livestock producers, this production system has the potential to significantly improve the profitability of livestock operations.