# Forage Management for Extending the Grazing Season

David W. Koch
*University of Wyoming*

C. M. Lux
*University of Wyoming*

J. W. Flake
*University of Wyoming*

**THEME # 22**

# FORAGE MANAGEMENT FOR EXTENDING THE GRAZING SEASON

David W. Koch, C.M. Lux and J.W. Flake

Department of Plant Sciences, University of Wyoming, Laramie 82071

## Abstract

Studies were conducted to determine ways to extend grazing season with forages adequate to meet the needs of grazing animals and to reduce the cost of livestock production. Perennial grasses were swathed, windrowed and left in the field until they were winter-grazed with bred heifers. Corn (*Zea mays* L.) was stockpiled for winter grazing with lambs and ewes. Windrowed grasses increased in acid detergent fiber (ADF) and neutral detergent fiber (NDF) compared with stored hay, but crude protein content, heifer weight gain and body condition change was similar for both forages. An economic value of \$218 $ha^{-1}$ from initial grazing of corn with lambs, followed by grazing with bred ewes, without supplementation, provided a net income over expenses of \$75 $ha^{-1}$. Leaving windrows of perennial grasses in the field and stockpiling corn for winter grazing have potential for reducing reliance on stored forages.

**Keywords:** cattle, sheep, hay, windrows, perennial grass, corn, animal performance, forage nutritive value.

## Introduction

In temperate climates, the active growth period of forages is often three to six months, leaving a relatively long period in which livestock graze dormant pasture or range or are fed stored forage. Large quantities of costly stored forage and/or purchased supplements are needed due to lack of an adequate supply of winter grazable forage suitable to meet animal nutritional needs. As a result, the single most expensive item in cow-calf operations in the northern Great Plains of the U.S. is winter feed (USDA, 1995).

Perennial pastures and range are the backbone for livestock operations. In areas with minimal winter precipitation, livestock producers can reduce production costs by extending the grazing season with high-quality forages. There is a need to study methods of preserving nutrients in stockpiled forages, both perennial and annuals, and in forages cut and left in the field. Advances in fencing technology have facilitated controlled grazing and better utilization of pastured forage.

Stockpiling forage (leaving in place) is less expensive than cutting and windrowing; however, most species suffer large losses in nutrients after maturing. Grasses are likely to be more amenable to stockpiling and windrowing than legumes. Cutting and windrowing forage and leaving in the field eliminates packaging, hauling, storing and winter feeding, the most expensive aspects of hay and silage systems.

Corn (*Zea mays* L.) is one of the most promising forages for winter grazing because it is upright in growth, can be stockpiled and is more resistant to snow and weathering than perennial grasses. Hybrids with greater nutrient concentrations in leaves and stalks than those in grain corn have been developed.

## Material and Methods

A study was conducted on a rancher's irrigated native hay field in which half was baled and half left in place for later grazing (Table 1). Forage was cut on 7 August. Alternate windrows were baled and hauled from the field and remaining windrows left in place until grazing and hay feeding began on 10 December. The study terminated on 21 February.

In 1999, a 3.9-ha field was planted with Cargill HS60A corn, a male-sterile hybrid, at a population of 74,000 plants $ha^{-1}$ (Table 2). Lambs (73 averaging 46.8 kg) were rotationally grazed from 1 October to 1 November. Bred ewes (64) grazed following lambs (12 October to 12 November). A similar group of ewes was fed millet hay. No supplemental feed was provided either lambs or ewes.

Forages were sampled at harvest and at initiation of grazing, dried at $55^0$C for 48 hours and ground to pass a 1-mm screen. Samples were analyzed for Kjeldahl N (AOAC, 1990), neutral detergent fiber (NDF) and acid detergent fiber (ADF) (Goering and Van Soest, 1970)

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## Results and Discussion

Crude protein content of windrowed hay did not differ ($P>0.05$) from that of stored hay and was not affected by wetter-than-normal weather in August and September; however, with windrowed hay NDF increased ($P<0.05$) between harvesting and 19 September and ADF increased ($P<0.05$) between harvest and 22 October. There was no difference ($P>0.05$) in heifers grazing windrowed hay left for winter grazing and heifers fed hay baled from the same meadow during the 22 October to 21 February period in terms of body weight or body condition change. Both groups of heifers (5 to 7 ½months gestation) gained weight and improved body condition, without supplemental feed.

Windrow-grazed and hay-fed heifers gained 37.7 and 34.6 kg, respectively. Body condition score increased from 5.4 to 5.9 for windrow-grazed and from 5.2 to 5.8 for hay-fed heifers (scale of 1 to 9; Wagner et al., 1989). Forage yield the next year was depressed in areas previously occupied by windrows; however, the loss was mostly compensated by an increase in production in areas adjacent to windrows.

Corn dry matter production was 7.4 Mg $ha^{-1}$, measured on 1 October, when grazing began. A killing frost had occurred on 16 September. An estimated 1.6 Mg $ha^{-1}$ of corn residue, including an average 20 cm of standing stalks, was left following grazing in order to prevent soil wind erosion. At this level of utilization, there was 84 kg $ha^{-1}$ of lamb produced at an estimated value of \$127 $ha^{-1}$, based on lamb market price of \$1.43 $kg^{-1}$. Savings in hay feeding of ewes was an estimated \$91 $ha^{-1}$, based on consumption of an equivalent group of ewes simultaneously fed hay valued at \$72 $Mg^{-1}$. Estimated income was \$218 $ha^{-1}$, exceeding the cost of growing and grazing the corn (\$143 $ha^{-1}$). Both hay-fed and corn grazed-ewes gained 0.12 kg $day^{-1}$, without supplement. Corn for grazing can be grown with less expense than corn harvested for grain. There is less risk, particularly in areas marginal for grain production due to short growing season and variable rainfall.

Other annual forages, such as millets (*Setaria* spp.), cereals and brassicas can extend the season with highly nutritional forages (Koch and Karakaya, 1998; Yun et al., 1999). Crop residues have been used for cows in early stages of gestation and other animals with minimal nutritional requirements, providing low-cost forage. Regrowth following the last hay or silage harvest of alfalfa and other perennial forages also can be used.

## References

**AOAC.** (1990). Official Methods of Analysis (15th Ed.). Association of Official Analytical Chemists, Arlington, VA.

**Goering, H.K. and P.J. Van Soest (**1970). Forage fiber analyses (apparatus, reagents, procedures, and some applications). Agric. Handbook No. 379. ARS, USDA, Washington, DC.

**Koch, D.W. and A. Karakaya** (1998). Extending the grazing season with turnips and other brassicas. Wyoming Cooperative Extension Service Bull. B-1051.

**USDA (**1995). Economic indicators of the farm sector: costs of production, 1993. Major field crops and livestock and dairy. Economic Research Service, EDIFS 13-3, Washington, D.C.

**Wagner, J.J., K.S. Lusby, J.W. Oltjen, J. Rakestraw, R.P. Wettemann, and L.E. Walter** (1989). Carcass composition in mature hereford cows: Estimation and effect on daily metabolizable energy requirement during winter. J. Anim. Sci. **66**:603-612.

**Yun, L., D.W. Koch, F.A. Gray, D. W. Sanson, and W.J. Means** (1999). Potential of trap-crop radish for fall lamb grazing. J. Prod. Agric. 12:559-563.

**Table 1 -** Effect of forage system on nutritive value of forage left in windrows as an alternative to baled and stored hay, Nunn Ranch, Bosler, WY

| | 8 August | | | 19 September | | | 22 October | | | 25 November | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| System | CP | NDF | ADF | CP | NDF | ADF | CP | NDF | ADF | CP | NDF | ADF |
| | | | | | | g kg$^{-1}$ | | | | | | |
| Windrows | 83 | 708[a] | 421[a] | 85 | 745[b] | 473[b] | 87 | 757[b] | 477[c] | 86 | 754[b] | 480[c] |
| Hay | 73 | 717 | 433 | 91 | 731 | 457 | 85 | 740 | 454 | 80 | 751 | 459 |

CP=crude protein; NDF=neutral detergent fiber; ADF=acid detergent fiber. Component means within a row, over time, followed by the same superscipt letter did not differ, P>0.05. Hay quality components over time did not differ. Systems did not differ.

**Table 2 -** Production, animal performance and economics of stockpiled corn grazed October 1 to November 12

| | |
|---|---|
| Dry matter production, Mg ha$^{-1}$ | 7.4 |
| Lamb average daily gain, kg | 0.15 |
| Lamb gain ha$^{-1}$, kg | 84 |
| Ewe grazing, hay replacement amount, Mg ha$^{-1}$ | 1.4 |
| Income, lamb grazing, $ ha$^{-1}$ | 127 |
| Income (savings), ewe grazing, $ ha$^{-1}$ | 91 |
| Total income, $ ha$^{-1}$ | 218 |
| Estimated production/grazing costs, $ ha$^{-1}$ | 143 |

Assuming lamb selling price of $1.43 kg$^{-1}$ and hay value of $72 Mg$^{-1}$. Lambs (73) grazed initially (Oct. 1 to Nov. 1), followed by 64 ewes (Oct. 12 to Nov. 12) . Similar group of ewes fed hay consumed 2.39 kg day$^{-1}$. Estimated cost of growing corn and cost of grazing were $106 and $37 ha$^{-1}$, respectively.