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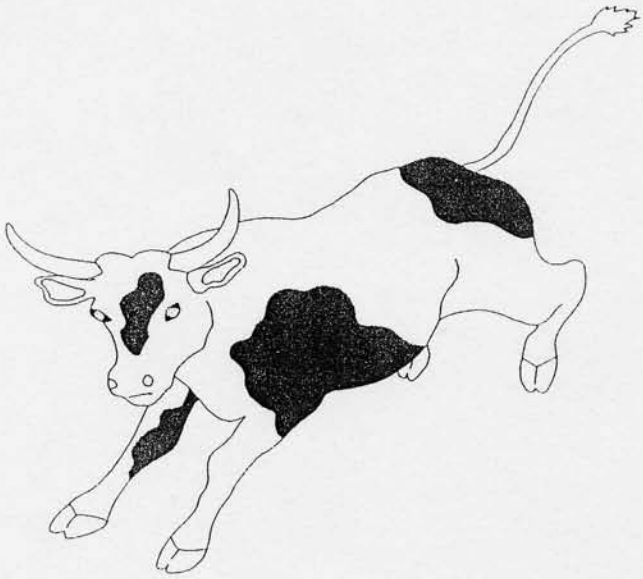

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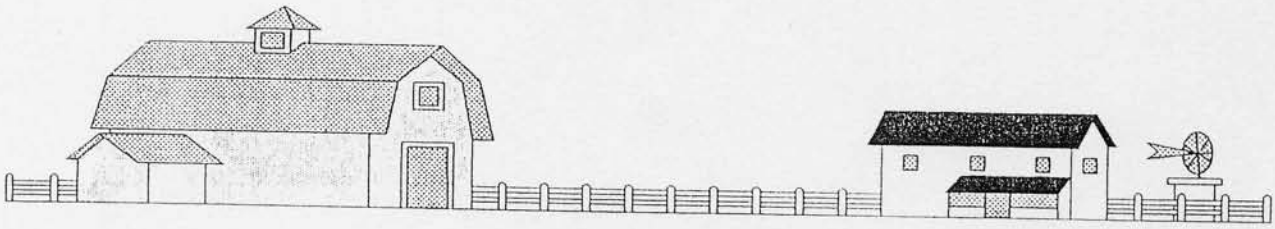

Oregon State University Cooperative Extension Service
Oregon State University Agriculture Experiment Station

Use of Grass Seed Residues as a Winter Feed Resource for Beef Cattle

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Introduction. Grass seed residue, commonly called "grass seed straw", can be a viable alternative winter feed source for dry, pregnant beef cows. Current market prices of $35 to $60 delivered at the ranch are competitive with other feed sources. In addition, continuing drought conditions in Eastern Oregon have resulted in increased interest in grass seed straw as an emergency feed resource. It should be noted, however, that grass seed residues offer tremendous potential as a permanent alternative to traditional meadow hay, allowing the flexibility of cow management that may be required by changes in public land policies.

The potential use of grass seed residues as a alternative winter feedstuff is not a new concept. Currently only a small fraction of these crop residues are used as a livestock feed. The lack of information and(or) industry knowledge regarding the nutritive quality of grass residues as a livestock feed is a primary factor limiting its use as a livestock feed resource. In addition, a stable market generating a steady supply and consistent quality of product has never been established in respect to utilizing grass seed residues as a livestock feed resource.

Dramatic changes are occurring in the grass seed and beef cattle industry which may integrate these industries in regard to grass seed residues. In the grass seed industry, air pollution concerns dictate a search for alternative methods of sanitization of grass fields and disposal of straw residue. In the beef cattle industry, large amounts of capital, as well as, meadow acreages are devoted to the production of hays for feeding cattle during the winter months. Concern over the use of public rangelands necessitates the need for management flexibility and may force the beef cattle industry to rely more solely on private rangelands and hay meadows in the near future. Therefore, the increased use of grass seed residues as a livestock feed resource may provide solutions to problems plaguing two of Oregon's most important agricultural industries.

Feed Resource Potential. The grass seed industry has changed dramatically in recent years. Grass seed production has increased over 40% since 1980. The total amount of residue

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removed from fields rather than burned or plowed down has increased four fold since 1980. Total residues available have been estimated at 800 thousand to one million tons for 1990. In addition, annual ryegrass is no longer the dominant seed crop with tall fescue and perennial ryegrass varieties nearing equal proportions in terms of total acreage (Figure 1). As a result, there is a greater quantity of residues available and the quality of these residues are substantially better than residues available in 1980. For example, tall fescue and perennial ryegrass alone yield more than 360 thousand tons of a potentially viable livestock feed. If properly supplemented, this is enough to successfully feed 45 to 60% of all of Oregon's mature producing cows (180 to 230 thousand cows through a five month winter feeding period). While this is obviously an oversimplified example, it does illustrate the large potential of grass seed residues as a livestock feed resource.

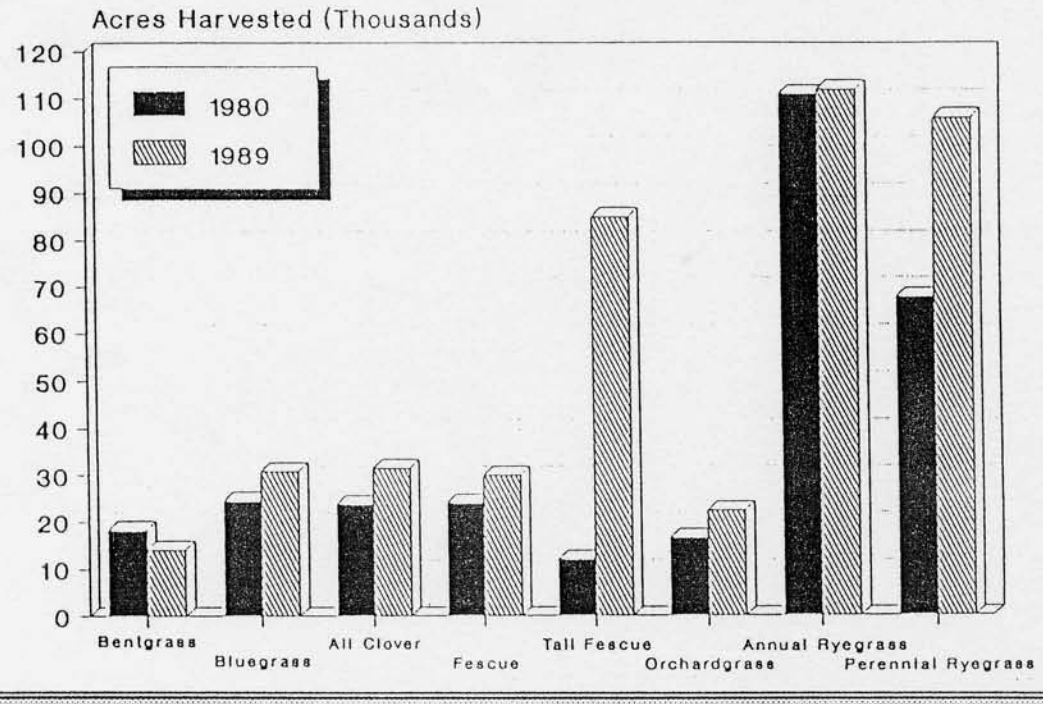

Figure 1. Total Acreages of Oregon's Grass Seed Industry (Oregon Agric. Stat., 1981 & 1990)

Nutritive Quality of Grass Seed Residues. One of the primary factors limiting the use of grass seed residues is the tremendous variation in nutritive quality. In fact, the past feeding of annual ryegrass residues and other residues that were of limited quality have left a lasting negative impression on the Oregon beef cattle industry. Most of the variation in quality can be attributed to different species of grasses, varieties within species, harvesting techniques and weather conditions at or before harvest. Although there is limited information available, perennial ryegrass, tall fescue, bentgrass and bluegrass appear to offer the most potential

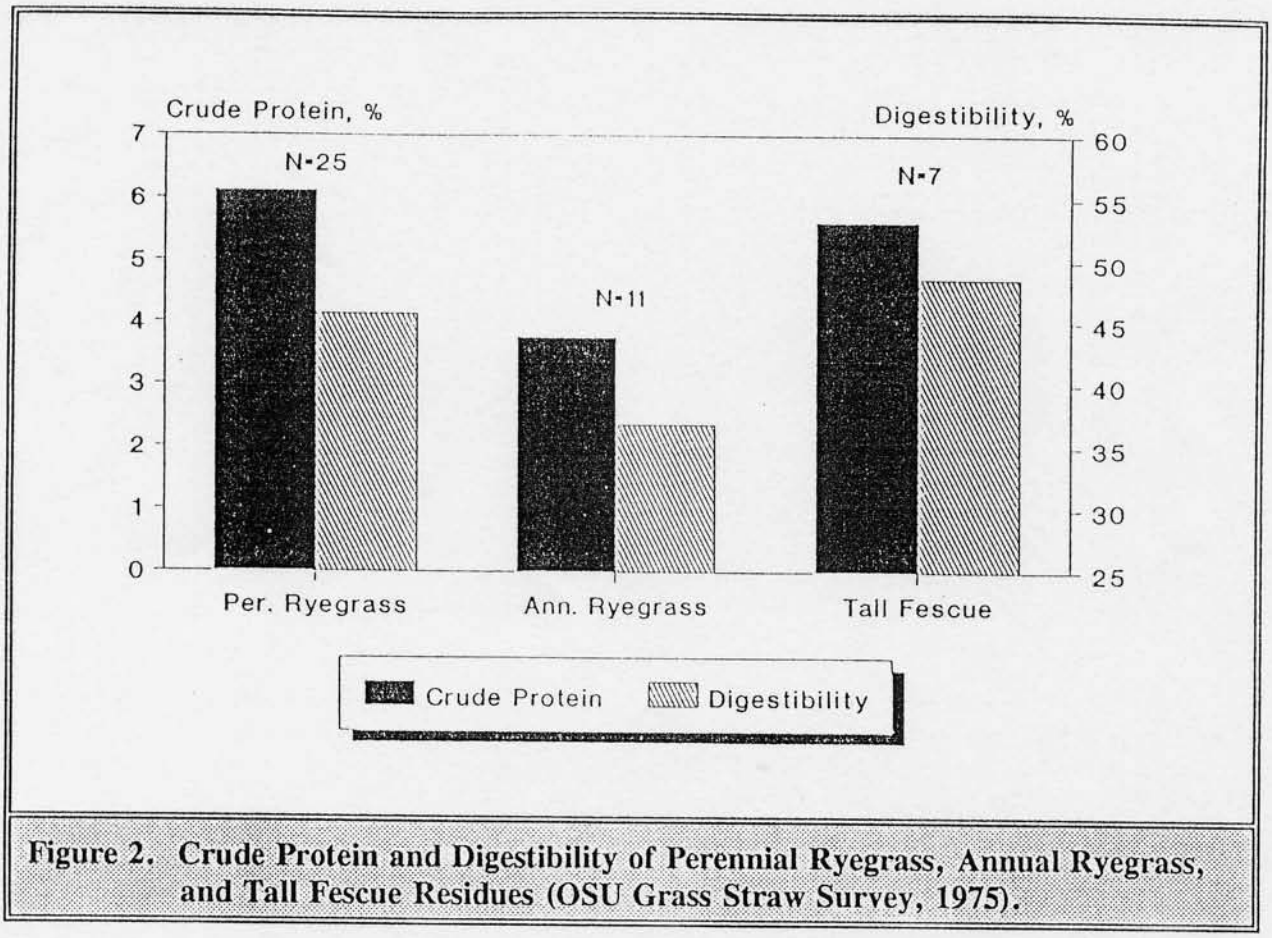

Figure 2. Crude Protein and Digestibility of Perennial Ryegrass, Annual Ryegrass, and Tall Fescue Residues (OSU Grass Straw Survey, 1975).

as a livestock feed in terms of nutritive quality and quantity available. In contrast, chewing and red fescues, orchardgrass, clovers and annual ryegrass are generally of limited nutritive value. In addition, the incorporation of green "reclipped" vegetative material can also have a positive influence on the nutritive quality of grass seed residues. In comparing the three largest grass seed crops, it is readily apparent that annual ryegrass is dramatically inferior in nutritive value to tall fescue and perennial ryegrass (Figure 2). It should be noted, however, that tall fescue and perennial ryegrass are only equal in quality on average to a low quality meadow hay. As a result, most grass seed residues need to be supplemented to some extent to achieve an acceptable level of livestock performance.

Anti-quality factors such as endophyte-fungus produced alkaloids are other factors to consider. Due to a lack of information regarding these particular problems, conservative recommendations are to avoid feeding known high endophyte-infected turf-type varieties of tall fescue and perennial ryegrass. Endophyte infected turf-type tall fescues are increasing rapidly in terms of total acreage. High-endophyte tall fescues are still less than 10 percent of the total tall fescue acreage. In addition, alkaloids associated with endophyte infected tall fescues have been shown to concentrate in the seeds and root system as the plant matures. The curing of hay/straw has also been shown to dramatically reduce the alkaloid level in endophyte infected tall fescues. As a result, endophyte alkaloid levels in tall fescue straw do not represent a large risk and, in all likelihood, will be associated with tall fescue residues which have a substantial amount of reclipped vegetative forage mixed in. In addition,

supplementation (or diluting the basal diet) will significantly reduce the risk of endophyte induced problems with tall fescue. At this point, very little is known about endophyte produced alkaloids associated with turf-type perennial ryegrass.

Feeding Recommendation of Grass Seed Residues. The major advantage of ruminants over other livestock species is their ability to effectively utilize low-quality roughages. However, even cattle need a little help with high-fiber, low-quality roughages like low-quality meadow hays, dormant/mature range forage or grass seed residues. Recent research at the Eastern Oregon Agricultural Research Center (EOARC) suggest that grass seed residues, when properly supplemented with alfalfa hay, yield comparable livestock performance to tradition meadow hays when fed to mature, nonlactating beef cows (Figure 3). For this particular study, alfalfa hay was hand fed (5 lbs per head per day) and represented only 20% of the total dry matter intake with tall fescue straw representing 80% of the diet.

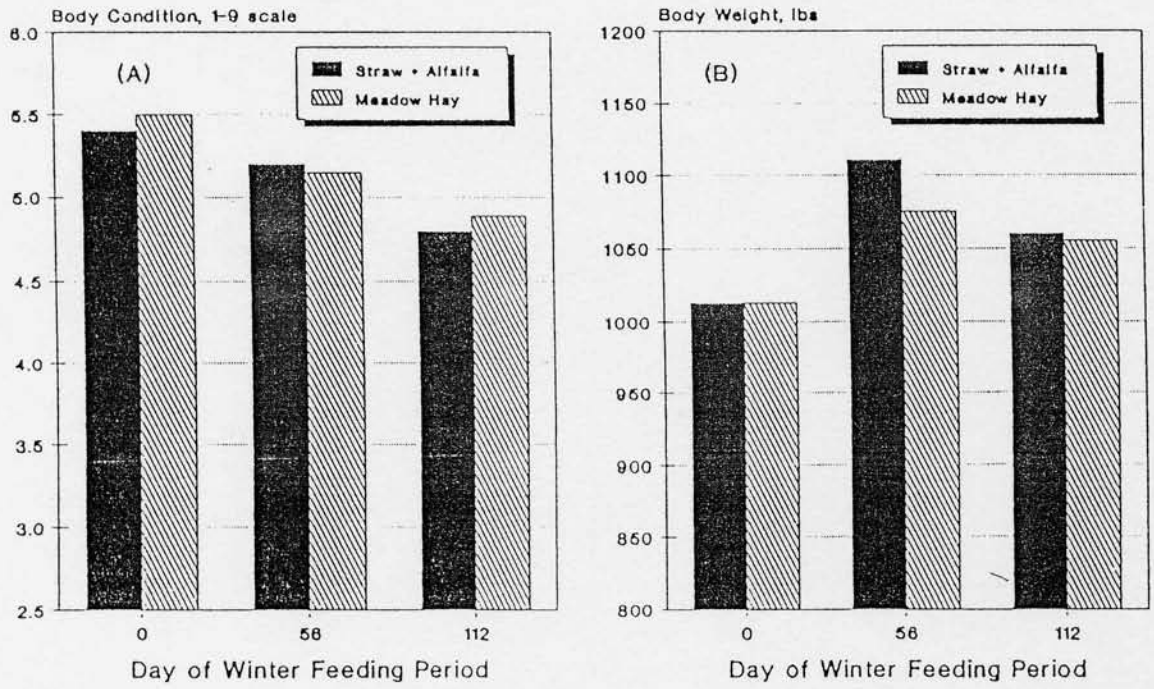

Figure 3. Body Condition (A) and Weight (B) of Mature, Nonlacting Beef Cows Receiving Diets of Meadow Hay or Tall Fescue Straw and Supplemental Alfalfa During the Winter Feeding Period (EOARC, Burns 1990-91).

In most instances, feeding grass seed residues as a major component of the diet should only be practiced with nonlactating, mature cows. The nutritional requirements of various classes

and stages of production of livestock are listed in Table 1. Crude protein and energy requirements are highest for growing animals and lactating cows. When fed as the major component of the diet, grass seed residues do not have the digestible energy and/or crude protein density to support optimal performance in these classes of livestock. Simply stated, beef cattle in high production stages cannot consume enough grass seed residues to meet nutrient demands.

Table 1. Nutrient Requirements* of Beef Cattle (National Research Council, 1984).

Stage of Production	Intake, lbs	CP, %	CP, lbs	TDN, %	TDN, lbs
700 lb Steer Gaining 1 lb/d	15.1	8.4	1.28	62.0	9.36
1100 lb Mature Cow:					
Mid-Gestation	19.5	7.0	1.40	48.8	9.50
Late-Gestation	21.0	7.8	1.60	53.2	11.2
Early-Lactation	21.6	9.4	2.00	56.0	12.1

*Requirements expressed on a dry matter basis; CP = crude protein, TDN = total digestible Nutrients.

With nonlactating, mature cows grass seed residues can be utilized very effectively. In the study at EOARC (Figure 3), mid to late gestation cows consumed 1.79 and 11.6 lbs of CP and TDN, respectively. The feeding strategy was effective in meeting the nutrient demands (Table 1) for mid and late gestation beef cattle. If the same feeding strategy were to be applied to cows in early lactationa nutrient deficiency would exist for both energy and protein.

In general, when low-quality roughages are not limited in quantity, supplemental protein will produce the most cost efficient production benefits. Hand fed natural protein supplements (15% or more crude protein) fed on a daily or alternate day basis will promote the best use of low-quality roughages and subsequent cattle performance. Protein supplements do not simply add to the basal ration but can improve both the intake and digestibility of low-quality roughages. Therefore, in addition to the nutritive value of the protein supplement, the increased volume and availability of nutrients from the low-quality roughage multiply the benefits the cow receives.

Protein blocks and lick-tanks containing nonprotein nitrogen (NPN) are effective supplements but, do not stimulate the intake and digestibility of the low-quality roughage as effectively as natural protein supplements. Therefore, while self fed NPN supplements are easier to use and often less expensive than natural protein supplements, reduced cattle performance should be expected. If NPN is a component of the supplement, most efficient usage of the NPN occurs when urea and biuret is less than 3% and 8% of the total supplement composition, respectively.

Actual supplementation strategies should be based on the nutritive value of the grass seed residue. In addition, the nutritional quality of grass seed residues display a large amount of variation and the differences in quality are often hard to visually determine. Therefore, having a chemical analysis conducted on the residue will eliminate the guesswork and allow for proper supplement formulation and feeding strategies. Your County Extension Agent can help you locate a laboratory that does accurate work at a reasonable price.

Chemical Modification of Grass Seed Residues. Numerous techniques have been tested under experimental conditions and found to be effective in increasing the intake and digestibility of cereal grain and grass seed straws. Anhydrous ammonia, urea, sodium hydroxide and hydrogen peroxide are examples of chemical agents used effectively in small scale research conditions. All of these compounds are effective in breaking down lignin-cellulose bonds and, as a result, increasing the digestibility of the low-quality roughage. Anhydrous ammonia and urea have the added advantage of increasing the crude protein content of the diet.

Only anhydrous ammonia treatment, however, has been proven effective on a large scale and practical/cost effective basis. The use of anhydrous ammonia, however, hinges on the availability of fertilizer dealers who stock and are willing to treat low-quality roughages with this chemical. Generally, the lower the quality of the roughage, the greater the benefit derived from treatment with anhydrous ammonia. In addition, anhydrous ammonia treatment of roughage with a substantial amount of soluble carbohydrates (ie. green vegetative material) can cause toxicological problems to beef cows, as well as, be transmitted through the milk to the dams' calf. Therefore, only low-quality roughages without a substantial amount of green vegetative material should be treated with anhydrous ammonia. If interested, your County Extension Agent can provide details regarding the treatment of low-quality roughages with anhydrous ammonia.

Purchasing of Grass Seed Residues. A "buyer beware market" is the best way to describe purchasing grass seed residues. Most grass seed residues are baled by a baling contractor who then sells it directly or turns it over to a broker. Very easily, purchasers of grass seed residue can be dealing one, two or even three steps away from the grass seed grower.

Grass seed is harvested in July and August in the Willamette Valley. In most cases, the grass seed crop is swathed, allowed to cure in the field for ten to fourteen days then combined. The resulting grass seed residue may then be baled directly behind the combine or the field may be swathed again to take advantage of grass regrowth. This second swathing called "reclipping" picks up a significant amount of fresh green material which when raked up with the grass seed straw produces a higher quality product. However, grass seed residues that lay in the field for an extended period become sun bleached, probably get rained on and in general lose nutritive quality.

Most grass seed residues shipped to Eastern Oregon are baled in 4 X 4 X 8 bales at 1200 to 1600 lbs each. Three wire small bales may also be available if special arrangements are made in advance.

A large portion of grass seed residues are stored for sale to Japan. Because storage is limited, grass seed residues not destined for Japan must be trucked out of the area before fall rains start. Outside storage, even with tarps has not been entirely successful due to the extremely wet conditions of Western Oregon in the fall. Therefore, contracts for grass seed residues should be made in the spring or early summer and purchased grass seed residues should be trucked out of the Willamette Valley before the first of October. Grass seed residue purchases made later in the fall have an increased likelihood of being of unknown origin, rain soaked and, as a result, very poor quality.

Checklist for Purchasing Grass Seed Residues. To minimize potential risks in purchasing grass seed residues, a buyer should insist on the following information:

Species _____
(Tall fescue, Perennial Ryegrass, Bentgrass, Bluegrass, etc..)

Type _____
(Forage-type, Turf-type)

Variety _____
(if known)

Endophyte Infection Rate _____
(Tall fescue and Perennial Ryegrass only)

Seed Harvest Date _____

Residue Baling Date _____

Field Conditions _____

Reclipped Green Material ____ Yes ____ No ___ %

Storage Conditions _____

Price (F.O.B. Ranch) _____

SUMMARY

* Grass seed residues can be a viable alternative winter feed source for dry, pregnant beef cows.

* Perennial ryegrass, tall fescue, bluegrass and bentgrass appear to offer the most potential as livestock feed in terms of nutritive quality and quantity available. Large quantities of green vegetative material ("reclipped straw") can make other species of grasses attractive as well.

* Nutritive quality of grass seed residues varies widely. Therefore, chemical analysis of each lot of grass seed residue is highly recommended and supplementation practices should be based on the quality of the grass seed residue.

* Optimal supplementation of grass seed residues can be obtained with hand-fed natural protein supplements fed daily or alternate days.

* Endophyte toxicity potential with tall fescue is low and can be further reduced by avoiding high endophyte varieties or diluting the grass seed residue with a natural protein supplement.

* To date, only anhydrous ammonia treatment is effective on a practical basis in increasing the nutritive value of grass seed residues. However, this chemical treatment is limited to areas with a anhydrous ammonia fertilization industry.

* Contracts for grass seed residues should be made before seed harvest begins in the Willamette Valley. Purchased grass seed residues should be shipped to Eastern Oregon before the fall rainy season begins in Western Oregon.

Suggested Reading

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