Oregon State University

BEEF090

Beef Cattle Library

Beef Cattle Sciences

Using Alternative Feedstuffs [1]

Professionally Reviewed

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Introduction

Annual feed costs for Oregon's beef producers are routinely greater than most, if not all, other regions of the U.S. Also, beef producers east of the Cascades (where 75% of Oregon beef cows are located) are challenged by a forage base that yields approximately 3 months of high-quality forage and 9 months of poor quality forage (Figure 1). In addition, because the average annual precipitation in this region is routinely less than 15 inches (60% of which comes in the form of snow) and there is extreme year-to-year variation in the amount and timing of precipitation, there can be tremendous variability in annual forage production. Consequently, beef producers often must feed some form of harvested forage and/or supplement for 4 to 7 months of the year. As a result, producers should routinely evaluate alternative feedstuffs as a means to supplement existing forage resources and reduce feed costs.

Considerations with Alternative Feedstuffs

When evaluating an alternative feedstuff for use in a nutritional management plan there are a number of considerations that should be evaluated prior to purchasing the feedstuff. These include:

What is the nutrient content and availability?

When evaluating a feedstuff for nutrient content the best method is to have a representative sample sent to a lab certified by the National Forage Testing Association (www.foragetesting.org) for nutrient analysis. This allows for accurate determination of nutrient content and proper balancing of diets to meet the animal's nutrient requirements (Cooke and Bohnert, 2011). The specific analyses needed to evaluate a feedstuff depends on the type of feedstuff and potential management concerns. A good overview of what to analyze in particular feedstuffs is provided in the Western Beef Resource Committee Cattle Producer's Library (CL305). If analysis from an accredited lab is not available and you are considering using an alternative feedstuff, contact your local extension agent or beef cattle specialist, a nutritional consultant, or feed industry representative to get their professional opinion, or "guess", as to the potential range in nutrient quality of a specific feedstuff. Table 1 is provided to give the reader an approximate nutrient concentration of some alternative feedstuffs common in the Pacific Northwest. However, there is no substitute for a lab analysis and this should always be the first, and best, option when attempting to determine the nutrient value and cost of a potential feedstuff. Another important consideration when purchasing an alternative feedstuff is to price it based on the amount of nutrient supplied, corrected for the dry matter (Western Beef Resource Committee Cattle Producer's Library, CL309).

Are there hauling, storage, and/or feeding issues?

Obtaining an alternative feedstuff may seem to be a great deal based on price and availability.

1. This document is part of the Oregon State University – Beef Cattle Library. Published in September 2012. Prior to acceptance, this document was anonymously reviewed by two experts in the area. For further information, please visit the Beef Cattle Sciences website at http://beefcattle.ans.oregonstate.edu.

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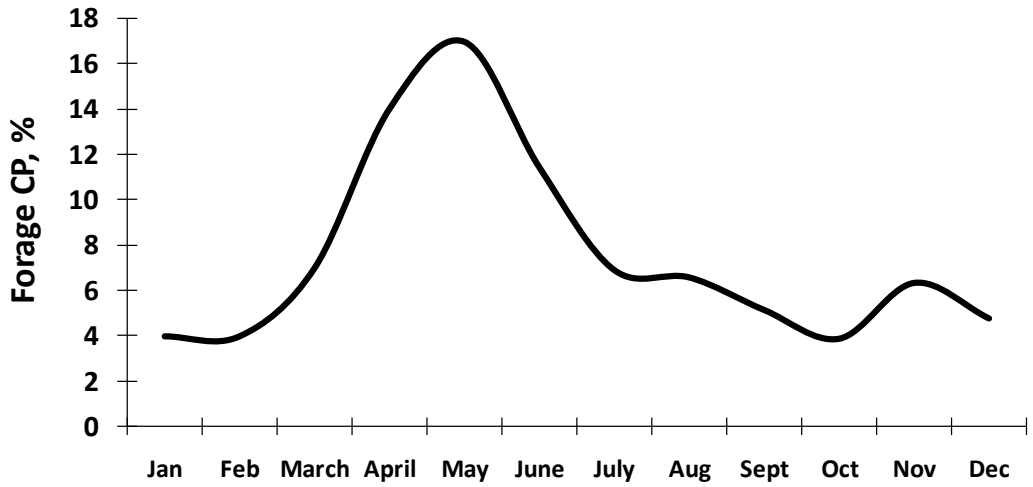

Figure 1. Dietary crude protein content in S. E. Oregon rangelands. Adapted from Ganskopp and Bohnert (2001); Vavra and Raleigh (1976).

However, storage and feeding considerations can make using such a feedstuff difficult, if not impossible, unless proper facilities are available. Common storage and/or feeding concerns with alternative feeds include:

1) *Moisture content* – Some alternative feedstuffs, such as wet distillers grains, cull onions, and cull potatoes can consist of up to 90% water. This can make hauling difficult and expensive. For example, a ton of cull onions that are 10% dry matter will contain 1,800 pounds of water! This can make a seemingly "great deal" cost prohibitive if the onions have to be hauled any substantial distance. Another challenge with high moisture feedstuffs is storage. They can tend to "run" or flow once unloaded and they have a tendency to ferment, especially in warm environments, which causes mold/spoilage issues. In addition, high moisture feedstuffs can freeze during cold weather making handling and consumption by cattle difficult.

2) *Feedstuff consistency/texture* - The bulkiness and associated storage space required for a given volume of a feedstuff varies. Sacking feeds is useful for feeding and storage in many cases but typically can be expensive. Some feedstuffs can be stored in upright bins, whereas other feedstuffs require storage areas such as commodity shed bays. However, feed storage facilities do not need to be fancy or expensive. They just need to be functional and well maintained.

3) *Feed Delivery* - On-farm feed mixing and delivery systems should be considered when selecting potential alternative feedstuffs. Particle size and other mixing characteristics can affect the flexibility of including a specific feedstuff as part of a feeding program.

4) *Feeder Design* – Feeder construction affects what type of feeds can be effectively provided to livestock. Some feedstuffs can be fed on the ground while others, such as wet distillers grain, will require a bunk.

5) *Purchasing agreement* – A purchasing agreement is something that most producers do not consider. However, if nutritional management decisions are made based on an anticipated availability, quality, and quantity of a feedstuff, a contract describing the expectations of both parties is just good business.

Are toxins/ contaminants a concern?

Many feedstuffs contain toxins/contaminates that can affect the health of cattle if present in high concentrations. If not managed properly, feeding these feedstuffs can result in decreased production and, potentially, death. Knowledge of the feedstuff, and more importantly, experience feeding it to cattle is the first step in determining if there are potential concerns with toxins or contaminants. In addition,

your extension agent, extension beef specialist, or nutritional consultant can be a valuable resource when evaluating alternative feedstuffs for a nutritional management plan. Some of the more common toxins/contaminates that are present in some feedstuffs available in the Pacific NW include:

1) *Nitrate* - Nitrate intake from 15 to 45 grams per 100 pounds of body weight is considered toxic and can result in rapid death. For more specific information on nitrate toxicity and management recommendations please see "Nitrates in Cattle Feed and Water" in the Western Beef Resource Committee Cattle Producer's Library (CL355).

2) *Alkaloids* – There are numerous types of alkaloids present in certain feedstuffs. For example, tall fescue can have ergovaline, perennial ryegrass can have ergovaline and Lolitrem B, and cull potatoes can have glucoalkaloids. Consequences of feeding high-alkaloid feedstuffs can range from temporary neurological problems, decreased performance and reproductive success, and in severe cases, death. More information on alkaloids can be found in "Toxic Contaminants in Harvested Forages" and "Health Concerns with Feeding Grass-Seed Straw Residues" in the Western Beef Resource Committee Cattle Producer's Library (CL619 & CL626).

3) *Ergot* – Ergot is a disease caused by the fungus *Claviceps purpurea*, and occurs primarily in cereal crops and grasses. The most common sign of ergot is a dark purple to black sclerotia (ergot bodies) found replacing the grain in the heads of cereals and grasses just prior to harvest. Wet weather and/or wet soils favor germination of ergot bodies. Ergot can be toxic when the sclerotia are consumed by animals. All domestic animals are susceptible, including birds, but cattle seem to be the most susceptible. More information on ergot can be found in an on-line publication from North Dakota State University (McMullen and Stoltenow, 2002).

4) *High Sulfur Content* – sulfur is an essential mineral for cattle; however, when dietary concentrations (from water AND feed) are greater than 0.3 to 0.4% it can result in health issues. The two primary concerns are decreased copper availability and development of polioencephalomalacia (commonly called "brainers"). An extension publication by Ward and Lardy (2005) provides an overview of sulfur nutrition of beef cattle.

5) *Glucosinolates* – glucosinolates are secondary metabolites found in all Brassicas (Tripsthi and Mishra, 2007; examples include turnips, cabbage, flaxseed, canola, rapeseed, camelina, cauliflower, & broccoli). Mature ruminants are more tolerant of glucosinolates than young ruminants. Consequences of excessive glucosinolate intake include weight loss, iodine deficiency (goiter), reduced intake, and depressed milk production.

6) *Mold* – Mold growth on feedstuffs is caused by the growth of microscopic fungal organisms – most always in the presence of excessive moisture. This reduces nutrient content and palatability and can, in severe cases, result in illness and/or death. Also, pregnant cows consuming moldy forage can be expected to have a 3 to 10% incidence of abortion (referred to as mycotic abortion; Western Beef Resource Committee Cattle Producer's Library, CL619).

Is there university feeding research available?

An excellent source of information on alternative feedstuffs is University research. The internet is a wonderful tool that allows producers to search for information on a particular feedstuff; however, it should come as no surprise that not everything on the internet is factual so use caution in interpreting information obtained in this manner. Nevertheless, our nations Land Grant Universities have on-line resources that can be an excellent source of science-based information on specific feedstuffs.

Conclusions

Alternative feeds can provide beef producers with economical alternatives to traditional feedstuffs. However, special considerations must be made related to moisture content, nutrient content, toxicity potential, and facilities necessary to properly handle and feed the feedstuff. Another point to remember when feeding a new feedstuff to livestock is to start at a low/moderate level of diet inclusion and slowly work them up to a level deemed safe by a

Table 1. Alternative feedstuffs available in the Pacific Northwest with approximate nutrient content (Adapted from Western Beef Resource Committee Cattle Producer's Library, CL302; Bohnert et al., 2010; Lardy and Anderson, 2009; David Bohnert, EOARC-Burns files)

Feedstuff	Dry Matter (%)	CP (%)	TDN (%)	Comment/Concern
Low Energy				
Mint Slug Silage	28	14	50	unavailable CP
Grape Pomace	90	13	33	low energy
Bluegrass Straw	90	5 to 9	54 to 60	
Fescue Straw	90	5 to 6	47 to 55	alkaloids; endophyte
Perennial Ryegrass Straw	90	4 to 9	49 to 63	alkaloids; endophyte
Annual Ryegrass Straw	90	3 to 5	49 to 53	low CP; low dig. and intake
Cereal Grain Straw	90	2 to 5	44 to 50	low CP; low dig. and intake
Corn Stalks	80	5	54	low CP; nitrate
High Energy				
Turnip Tops	13	22	67	nitrate; mold
Turnips, Roots	9	12	85	choke; polio; fog fever; glucosinolates; nitrate
Corn Cannery Waste	21	7	70	
Distillers Grains, Wet	30	34	95	sulfur; polio; copper status
Distillers Grains, Dry	92	30	90	sulfur; polio; copper status
Brewers Grains, Wet	24	26	67	
Cull Potatoes	20	10	85	choke; glucoalkolaids; pesticides; limit to ≤ 50% of diet
Potato Waste	20	10	85	
Lentil/Pea Screening	88	17	68	dirt contamination
Grass Seed Screenings	88	12	58 to 65	ergot; alkaloids
Grain Screenings	90	14	70	dust
Bakery Waste	92	10	88	high fat
Cull Onions	10	12	60	choke; anemia; limit to ≤ 25% of diet
Cull Carrots	12	10	84	fat color (if used in finishing)
Beet Pulp, Dry	91	9	75	lower intake; limit to ≤ 50% of diet
Cull Beans, Dry	90	24	85	laxative; limit to ≤ 30% of diet
Protein				
Camelina Meal	92	37	89	palatability; glucosinolates; limit to ≤ 10% of diet
Canola Meal	90	44	69	palatability
Sunflower Meal	90	39	64	bulky; high in degradable protein
Soybean Meal	90	50	85	high CP; very palatable
Cottonseed Meal	91	46	76	gossypol
Weeds				
Annual Kochia	87	17	57	nitrate; photosensitization; alkaloids; oxalate
Perennial Pepperweed, vegetative	20 to 40	16 to 20	NA	high CP
Russian Knapweed, Hay	90	13 to 18	50 to 70	good CP; toxic to horses

nutritionist or by past personal experience. Also, remember that your local county extension agent and state beef specialist(s) can be a great asset in helping answer questions related to alternative feedstuffs.

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