

DRAFT DROUGHT TIP AUGUST 2015

Supplemental feeds for cattle operations during drought

Josh Davy, Jeff Stackhouse, and Glenn Nader, University of California Cooperative Extension

One of the advantages of cattle production in California is the diversity of feeds that are available to livestock managers that choose to supplement cattle. In most cases supplementing with alfalfa or a combination of alfalfa and small grain hay is the easiest method to meeting protein, energy, and calcium needs when rangeland runs short due to drought. When the market prices of traditional hay supplements become high, it becomes necessary to consider alternative feed sources. There are alternative supplemental forages available as high nutrient concentrate or fiber-based roughages, making it possible to form a complete ration that satisfies both nutrient and dry matter intake requirements of cattle.

The prices of these feeds vary, making it important to check costs each time a supplemental ration is being formulated. It is likely that the same supplemental ration will not be used two years in a row. A ration balancing program such as [‘Taurus’](#) offered by the University of California is a great tool for developing the lowest cost supplement that meets the nutrient requirements of the particular class of cattle being supplemented.

All supplemental feeds have advantages and disadvantages to consider. The following information provides considerations of commonly available concentrate and roughage sources available in California. In general, challenges to feeding supplemental feeds include:

- Variation in feed nutrient value
- Handling and feeding requirements
- Possible nutrient imbalances from novel feeds with high nutrient value that are added to the ration when cattle are normalized to a range and pasture diet

Concentrates

Table 1. Example concentrate energy sources and their respective average nutrient values

Average Values (%)	Dry Matter	Crude Protein	TDN	Crude Fiber	Ash
Rice bran	91	14	76	12	14.8
Almond hulls	91	4.2	54	17	6.6
Canola meal	88	36	63	10.6	6.3
Walnut meal	93	17.1	67	27	4.9
Safflower meal	92	23.9	55	34	4.3
Pinto beans	90	25.2	83	4.5	4.8

Source –*By-Products and Unusual Feedstuffs in Livestock Rations. Western Regional Extension Publication No. 39, October 1980. 22 pages*

Rice bran

With 13% fat content, rice bran historically has been popular as an energy feed. It also contains protein, B vitamins, and high levels of readily available phosphorus, though it is low in calcium. Rice bran should not exceed 20% of the ration, as high amounts of unsaturated fats can lower cellulose digestion, impact fat metabolism, and increase absorption rates. Animals fed too much rice bran commonly go off feed or scour. Rice bran fed with salt can limit intake on range operations. To avoid over-consumption, monitor consumption rates and adjust salt levels to reach the desired intake. The added salt levels can increase water consumption, which may be critical to address during a drought year. A starting mix could be 50% salt and 50% rice bran. Producers with hammer mills have simply poured rice bran over the top of baled hay before adding to the mill for processing.

Almond hulls

Almond hulls are similar to grass or grain hay as a source of energy, but are lower in protein (CP=4.5%). They can be fed in troughs or a hot wire can be placed on the edge of a stack and moved in as the cattle consume the hulls. There is some waste of the product with electric fence method, but it saves labor and infrastructure costs. The major problem with the purchase of hulls is that some processors sell loads of hulls that may contain low nutrient contaminants of shell or twigs. It is prudent to get a purity percent and/or nutrient testing before comparing price quotes on almond hulls. Shells in the almond hulls can cause compaction in cattle and should be avoided even if the price is discounted. Below is the legal standard for the sale of almond hulls or shell.

2773.5. Almond Hull Products.

(a) Almond hulls are obtained by drying that portion of the fruit which surrounds the nut. They shall not contain more than 13.0 percent moisture, nor more than 15.0 percent crude fiber, and not more than 9.0 percent ash. If they contain more than 15.0 percent but less than 29.0 percent crude fiber, they shall be labeled "Almond Hull and Shell", and the maximum percent of crude fiber shall be stated. If the crude fiber exceeds 29.0 percent, the product shall be labeled "Almond Shell". If the ash exceeds 9.0 percent, the term "and dirt" shall be included in the product name. Almond hull products shall be free of foreign material, including plastic, glass, and metal except in such trace amounts as unavoidably occur in good manufacturing practices.

(b) When the following almond hull products are used in a mixed feed, the maximum percent shall be stated. (1) Almond Hull and Shell (2) Almond Shell (3) Almond products containing more than 9.0 percent ash.

Authority: Sections 407 and 14902 of the Food and Agricultural Code

Oil seed meal

As consumption of vegetable oils by humans increases, more oil seed meal is available. These feeds are high in both protein and energy. The effectiveness of the processing plant to extract the oil from the seed will vary the energy content of the meal. Safflower is the most common in Northern California. Dairies are now using canola meal from Canada. It comes in pellets, as that is only way they can ship it in rail cars to California. Feed mills and brokers are common methods of locating this feed. Pricing can be highly variable.

Beans

Bean processors will have some tested lots that are rejected for human consumption and subsequently sold to livestock operations. Beans work best for sheep because they need to be cracked or softened to facilitate consumption by cattle.

Corn

Though traditionally rejected as too expensive, corn often comes down in price and should always be priced due to its extremely high energy value. In previous droughts, corn has been used to spare limited hay supplies. The general rule of thumb is that one pound of corn will replace two pounds of alfalfa or three pounds of meadow hay. The challenge for range operations is finding a way to feed corn at the ranch. Troughs or feeders work best. To avoid related costs of troughs and infrastructure, ranchers have been very innovative in finding alternative techniques for feeding fine feeds. One example rancher bought a used large three foot wide conveyer belt from a Nevada mine and used a feed wagon to distribute the grain down the conveyer belt as if it were a feed bunk. A connection was added to one end which allowed them to pull it around the ranch to different locations. Storage also needs to be addressed because corn stored without another grain in the mix will spoil quickly in a silo type storage system.

Roughages

During droughts or when dry matter is limited, rice straw and corn stover (baled corn stocks) have been used as low quality forage. It is recommended that before purchasing either of these products that a laboratory analysis should be conducted for crude protein and acid detergent fiber (ADF). This allows the producer to select a product of the higher nutrient value that will decrease supplement costs to meet cattle needs.

If you are sampling the stacks of baled straw after harvest to determine if the straw meets quality specifications, take 25 core samples around the stack placing them all in one labeled and sealed zip lock bag, which can be mailed to the laboratory for analysis. Hay sampling probes can be purchased online or locally in farm stores. Have the samples analyzed for crude protein (CP) and acid detergent fiber (ADF) at laboratories that provide forage evaluation.

As the primary agricultural purpose of this forage type is not livestock feed, it is important to ask the farmer about the label on all herbicides, desiccants, and pesticides applied to see if their presence restricts your ability to use the straw for feed.

Table 2. Example roughage sources and their associated nutrient values

	Crude Protein	ADF	Ash
Corn Stover	5.9	46	5.8
Rice Straw	4.5	48	16.6
Wheat Straw	3.6	52	7.2
Lima Bean Straw	7.6	39	9.3
Kidney Bean Straw	9.9	43	10.4

Source - By-Products and Unusual Feedstuffs in Livestock Rations Western Regional Extension Publication, No. 39

Rice Straw

A survey of over 70 harvested rice straw stacks found large variances in CP (2-7%) and ADF (44 to 55%). Research has not been able to completely explain the reasons for this variability of rice straw nutrient values but has narrowed down some of the factors that may influence quality. These variables include the days baled after harvest, nitrogen management, location or soil type, and the variety of rice. Acid detergent fiber is a laboratory method of determining the fiber content that can assist in predicting the digestibility of a feed. A lower ADF value leads to a more digestible feed. A

non-lactating beef cow requires a diet containing 7% crude protein. The lower the CP percent of the straw the higher costs for concentrate feed additives necessary to meet the cow's nutritional requirements. The University of California has developed nutritional testing recommendations for rice straw to enable purchasers to optimize the beef cattle performance and intake when feeding rice straw as a part of the diet. Forage quality of rice straw used for livestock feed should meet the following criteria:

- Crude Protein of 4.5% or higher
- ADF of 50 % or lower
- Moisture of 12% or lower

For more information on rice straw see additional publications:

- *Feeding Rice Straw to Cattle* - <http://anrcatalog.ucdavis.edu/pdf/8079.pdf>
- *Rice Producers Guide to Marketing Rice Straw* - <http://anrcatalog.ucdavis.edu/pdf/8425.pdf>
- *Rice Straw Use in Dairy Heifer Rations* - <http://anrcatalog.ucdavis.edu/pdf/8392.pdf>

Corn Stover or Baled Corn Stocks

An Oregon State study on corn stover is reported below and illustrates the variability of this as a forage product.

Corn Stover Analysis Results

	DM	CP	TDN	NO3-N
1	85.8	3.7	53.4	
2	82.1	4.5	52.5	1270
3	84.6	5.1	54.3	1560
4	77.8	5.2	49.8	750
5	84.8	3.9	55.2	705
Average	83.02	4.48	53.04	1071

all results are reported on a Dry Matter basis

Feeding of corn stover is best utilized by placing bales in feeders. Experience has shown more waste than rice straw when placing corn stover free choice in the field. Corn stover that has the stocks chopped before baling increases complete consumption. High nitrates can be a problem in corn stover, especially if non-protein nitrogen supplements such as urea are being fed. Analysis for nitrates may also allow for prudent management of feed for the safety of the cattle.

Bean or Pea Straw

Farming operations that grow peas or beans for human consumption have residue (straw) that can be baled after harvest. The material is dry, and ranchers report that intake will slowly increase as cattle get accustomed to it as a forage. Growers that have drip tubes in the crop field may be concerned about soil compaction during the baling process. Keeping the baler and harrowed tires in the down furrors can minimize the impacts.

Rice Strawlage

Previous university research demonstrated that during the drying process traditional rice straw decreases in digestibility (27%). An experimental process of baling rice straw right behind the harvester at 50% moisture to preserve quality has been conducted for three years. At baling a product containing propionic acid and a buffer to prevent baler corrosion is sprayed onto the straw as it enters the baler. Once in a stack the bales go through a swet with temperatures around 130

degrees the first few days after baling. It is important that the stacks are tarped properly. Temperatures then drop to approximately 90 degrees and the product can be fed at 30 to 45 days. Intakes appear to almost double as compared to dry straw. Current data indicates an increase in available energy.

Baling rice straw as a high-moisture strawlage product is a new practice with further research required. Mold formation throughout the stack and water condensation on the top bales under the tarp are two hurdles that need to be addressed. It is also possible that a systemic rice fungicide application of azoxystrobin (Quadris) may be reducing mold formation. Nitrogen in the form of urea applied to individual bales at harvest has also shown some promise in deterring mold and increasing intake, though the process is labor intensive. Current University of California research is testing many different rice straw baling practices to increase straw quality and palatability with results expected in the next few years.



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