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Calf Note 202 – What’s in your starter?

Introduction

Calf starters are an important component of calf nutrition and the quality of the starter you feed can have a profound impact on how well your calves grow. The ingredients used in calf starters have important implications to the quality of the starter and the calf’s ability to utilize the nutrients in the starter.

Calf starter labels are one source of information regarding calf starter quality. Your feed manufacturer may also have additional feed information available product bulletins. Be sure to ask if there is more information available.

The Feed Tag

What can we learn from a feed tag? Let’s take a look at the feed tag in Figure 1. At the top, the feed tag includes the name of the feed (EXAMPLE FEED LABEL TAG). This product contains decoquinatate (Deccox), a commercial coccidiostat compound. The text “*For prevention of coccidiosis...*” is text required by the FDA to inform the consumer that the product is to be used in specific situations – in this case to control coccidiosis in calves. The drug inclusion level is included next. In this feed, the drug (decoquinatate) is fed at the rate of 45.4 grams per ton.

The guaranteed analysis is included below the drug listing. These are minimum and maximum concentrations of nutrients in the feed, guaranteed by the feed company. The specific listing may vary from state to state (and country to country), so this listing is only an example. We can see that the feed is guaranteed to contain a minimum of 18% crude protein, a minimum of 2.5% crude fat, a maximum of 6% crude fiber and 10% ADF. The listings for calcium and salt are a range – they include a minimum and a maximum. Finally, a minimum guarantee for phosphorous, selenium and vitamin A. These label guarantees give you the amount that should be found in the feed if you sent a sample of this feed into the laboratory. They should also be consistent with the nutrient requirements of the calf for the age at which the feed is to be offered.

Compare the guaranteed analysis in Figures 1 and 2. Note that the listing in Figure 2 contains vitamins A, D and E, whereas Figure 1 only guarantees vitamin A. This may be due to company policy or it may be mandated by the location of the feed company. In the United States, feed regulations can vary from state to state (although there is an organization that attempts to

EXAMPLE FEED LABEL TAG	
MEDICATED	
A COMPLETE GRAIN FEED FOR STARTING CALVES	
For prevention of coccidiosis in ruminating and non-ruminating calves, including veal calves, and cattle caused by <i>Eimeria bovis</i> and <i>Eimeria zuernii</i> .	
ACTIVE DRUG INGREDIENT	
DECOQUINATE.....	45.4 G/TON
GUARANTEED ANALYSIS	
CRUDE PROTEIN, MIN.....	18.0%
CRUDE FAT, MIN.....	2.5%
CRUDE FIBER, MAX.....	6%
ACID DETERGENT FIBER (ADF), MAX.....	10%
CALCIUM, MIN.....	0.7%
CALCIUM, MAX.....	1.2%
SALT, MIN.....	0.4%
SALT, MAX.....	0.8%
PHOSPHOROUS, MIN.....	0.5%
SELENIUM, MIN.....	0.3 ppm
VITAMIN A, MIN.....	12,500 IU/LB
INGREDIENTS	
Grain Products, Processed grain by-products, Soybean meal, Linseed meal, Can molasses, Monocalcium phosphate, Dicalcium phosphate, Calcium carbonate, Salt, Vegetable oil, Vitamin A acetate, Cholecalciferol (source of Vitamin D3), Vitamin E supplement, Calcium iodate, Magnesium oxide, Manganous oxide, Ferrous sulfate, Potassium chloride, Zinc oxide, Cobalt carbonate, Sodium selenite, Natural and artificial flavors, Ethoxyquin and BHT (preservatives).	
FEEDING DIRECTIONS	
Feed 18% Calf Starter at a rate of 2 pounds per 100 pounds of bodyweight. This will provide 22.7 mg of decoquinatate per 100 pounds of bodyweight. Feed at least 20 days during periods of coccidiosis exposure or when experience indicates that coccidiosis is likely to be a hazard. Coccidiostats are not indicated for use in adult animals due to continuous previous exposure.	
Warning: Do not feed to cows producing milk for feed.	
Manufactured by:	
Joes' Feed Company	
Anytown, NY 46859	
NET WT 50 LBS (22.68 kg)	

Figure 1. Example feed tag.

standardize regulations). Generally, more information on a feed label gives the consumer more information to make a better decision but is more difficult for a feed company to guarantee.

The ingredient listing comes next. Note that the first two “ingredients” in Figure 1 are “Grain products” and “Processed grain by-products”. These are called “Collective Terms”. Collective terms refer to groups of ingredients such as “grain products” or “plant protein products” that do not refer to a specific ingredient. These terms allow the feed manufacturer to replace one ingredient for another without having to change the tags. For example, corn and barley are both “grain products”. Thus, the feed manufacturer can remove corn from the starter and replace it with barley without changing the tag – if all the guaranteed analyses are met. Figure 2 also contains “Plant Protein Products” – ingredients such as soybean meal, canola meal, or corn gluten meal. Collective terms are allowed in the U.S. but may not be used in other countries. Some companies may not use collective terms, and instead list all the specific ingredients on the label. However, very few labels include the composition of the feed – i.e., the percentages of each ingredient. This recipe is the proprietary information of the company and is not normally disclosed.

In both figures, the manufacturer took advantage of collective terms to improve the flexibility in formulation. There are some important considerations to this flexibility. Let’s consider an example. Let’s say the original formula in Figure 2 originally contained canola meal. However, let’s also say that the price of canola meal has increased in price and soybean meal has become much cheaper. It would be advantageous for the company to replace canola with soybean meal. In that way, the company can maintain the price of the feed (or make it less expensive). It will also potentially change the amino acid composition of the feed. Of course, from a nutritional standpoint, the amino acid profile of the feed is very important to the nutrition of the calf. So, the flexibility of collective terms to allow changes in ingredient inclusion can potentially have significant effects on the actual nutrition received by the calf. Many feed companies will include amino acid requirements in their formulas, even if they are not included on the feed tag.

The Nutrients in Starter

Let’s look at the nutrients in a typical calf starter and how much they can vary.

Moisture. Nearly all feed ingredients used in calf starters carry some residual water. Some (whole grains) will contain more water, while some mineral ingredients will have none. Fats and oils usually have no water. Typically, most calf starters will contain 10-15% moisture. If there is too much water in the feed, it will quickly spoil and become moldy. Water also has no protein, fat or carbohydrates. Thus, it’s necessary to control the amount of water in the feed. In our calculations of nutrition, we’ll assume that a typical calf starter will contain 12% moisture. It is NOT common for feed manufacturers to include moisture on the feed label.

Ash. It is necessary to add vitamins and minerals to the calf starter to meet the calf’s nutrient requirements. There is also some ash in most ingredients, so the amount of ash in a calf starter can be significant. In the U.S., it is not generally required that a minimum or maximum ash

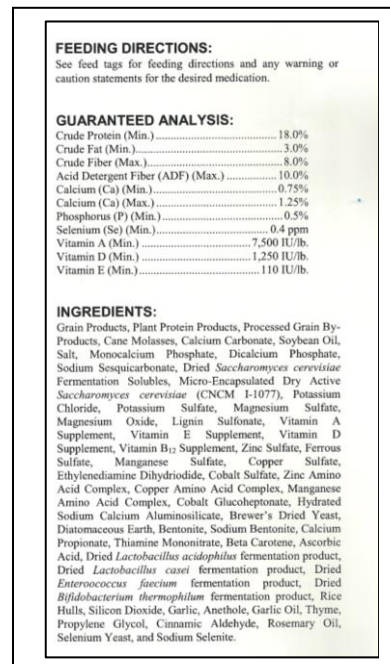


Figure 2. Example feed tag with additives.

concentration be included on the feed tag. Inclusion of large amounts of cheap mineral ingredients (e.g., limestone) can reduce the cost of a formula, but at the cost of reducing the nutrition of the product. High amounts of ash simply to reduce cost is bad formulation.

Protein. The protein content of a starter is almost always listed on the feed tag, usually as a minimum. Of course, it's possible for a company to put more protein into a ration, but protein is normally the most expensive macro-nutrient in a starter, so it's not in the company's best interest to include more protein in a feed than is required on the tag. Protein is an essential nutrient for the calf, so it is important to evaluate the concentration of protein with the protein requirements of the animal. Calves also need amino acids, which are the building blocks of protein. When the calf is very young, significant amounts of dietary amino acids (e.g., lysine, methionine) may escape ruminal fermentation and be available to the calf. Thus, some companies may add amino acids to their calf starters. If they are included in the formula, they must be included on the label.

Fat. Fat is not normally a major component of calf starters. Generally, it will be included at 3-6% of the formula. In young calves, we generally think about providing protein and carbohydrates that can be fermented to volatile fatty acids to start rumen development. In Figures 1 and 2, most of the fat will come from the grain products (e.g., linseed meal in Figure 1) and from added fat such as vegetable oil or soybean oil.

Vitamins. Nearly all calf feeds will contain one or more of the fat-soluble vitamins – A, D and E. I believe all should be included and listed on the label. You can see in Figure 1 that vitamin A is listed on the label, whereas in Figure 2, all three fat-soluble vitamins are included. This is particularly interesting because if you look in the ingredient listing in Figure 1, the company includes “Cholecalciferol” as a source of vitamin D3. So, there is vitamin D added to the product, but it is not guaranteed on the label. The actual amount of added vitamin D should be available from the company.

Inclusion of B-vitamins is somewhat controversial in the industry. Addition of B-vitamins is generally not needed in feeds for adult ruminants, since the rumen microbes produce B-vitamins and any added B-vitamins would likely be degraded by the rumen bacteria. Thus, addition of B-vitamins to adult feeds (without rumen protection) is not useful. However, in very young calves, the rumen bacteria may not be developed enough to produce the total amount and type of B-vitamins needed by the calf. Therefore, it is prudent to include B-vitamins in calf starter feeds intended to be fed to calves prior to weaning and during the weaning transition. In Figure 2, we can see ingredients included in the formula include thiamine mononitrate, vitamin B12 supplement, which are sources of B-vitamins. Formula in Figure 2 also contains ascorbic acid (vitamin C) which is also recommended in calf starters for young calves.

Minerals. There are a large number of minerals formulated into calf feeds to meet the calf's nutrient requirements. Levels of important macrominerals such as calcium and phosphorus are almost always included on the feed tag. Others (potassium, magnesium, sodium) may or may not be included. Concentrations of important microminerals (selenium, copper, manganese, cobalt, iodine) are not often included on the feed label. However, we can glean from the feed tag whether or not these minerals are included and in what form. For example, in Figure 2, we can see the inclusion of copper amino acid complex, manganese amino acid complex, zinc amino acid complex, cobalt glucoheptonate, ferrous sulfate as source of minerals. The term “zinc amino acid complex” means that the company included an organic source of zinc (a zinc amino acid). Many researchers and nutritionists believe that organic minerals are more efficiently absorbed by the animal and, therefore, more nutritionally adequate. They are also generally more expensive than the inorganic sources. The feed in Figure 1 (a much cheaper formula) includes cobalt carbonate, sodium selenite,

zinc oxide, manganous oxide, calcium iodate, and ethylenediamine dihydriodide as sources of minerals. These sources are less available to the calf but are also less expensive. The choice of inorganic or organic minerals for calf feeds is the subject of some debate and research in the industry. The cost-benefit ratio is not completely clear, but many companies feel that it is worth the investment to use higher quality organic minerals to ensure optimal nutrition for the young calf. Good mineral nutrition is important to the calf and meeting the animal's mineral requirements establishes good growth through the weaning transition.

Carbohydrates. Calf starters contain more carbohydrate than any other category of nutrients. Let's consider an example. Say a calf starter contains 12% moisture, 18% protein, 5% fat, and 5% ash (minerals). So, the remainder: $100 - 12 - 18 - 5 - 5 = 60\%$ carbohydrate. This carbohydrate can be divided into fiber (NDF) and non-fiber (NFC) carbohydrate. The NFC fraction contains mainly starch, sugars and pectin. Unfortunately, it is not normally clear what proportion of the total carbohydrates are NDF and NFC in most calf starters. Formulas vary widely. Some formulas may contain >40% starch whereas others may contain <20% starch and much more NDF. Since NFC is normally more nutritionally available than NDF to young calves, the total amount of energy available within the feed may vary substantially. We can get an idea of the fiber composition by looking at the crude fiber or ADF concentration, but a better indication is the NDF content. This is not normally included on most feed tags (in the U.S.).

Additives. Many nutritional additives can be added to calf feeds to improve growth or health of the calf. For example, Figure 2 contains several additives that are intended to support gut health and reduce the risk of disease (e.g., micro-encapsulated dry active saccharomyces cerevisiae (CNCM I-1077), dried lactobacillus acidophilus fermentation product, bentonite, thyme, garlic oil and others). If you think the calf feed you are using or considering contains some of these additives, be sure to discuss them with your feed representative.

Other additives are included in many formulas to ensure good handling or manufacturing of good pellets. For example, in Formula 2, lignin sulfonate is used to maintain good pellet quality and rice hulls are likely included as a carrier for some of the vitamin or mineral ingredients.

Summary

Feed tags are one source of information of the quality of the calf feed. Though they are not a complete description of the total nutrient quality, they provide important insights into the value of the product to support growth and health of the calf.

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