

## Nutrient Composition of Livestock Feed and Its Impact on Farm Productivity.

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### ABSTRACT

Nutrients such as macronutrients and micronutrients are substances that are metabolized by animals to give energy and build tissue. Lack of nutrients, or nutrient deficiency, prevents normal growth of animals. All nutrients play important roles throughout the body and are key to healthy, growing animals. The lack of certain nutrients can cause serious problems to the animals and in the productivity of the farm. In this study, we shall obtain livestock feed from farms that contain fermented feed mixture and non-fermented feed mixture and analyze their nutrient composition. Growth rates will be determined to see if there is any difference between farms in productivity.

Keywords: *Nutrients, Livestock Feed, Growth Rates, Nutrient Deficiency, Productivity*

### INTRODUCTION

Nutrients are substances used in an organism's metabolism or physiology, which must be taken from the environment. The two types of nutrients are macronutrients and micronutrients. Macronutrients are chemical elements that are consumed by animals in significant quantities. Micronutrients are vitamins, minerals, and elements that are found in small quantities and only required in small quantities. Examples of micronutrients consist of copper, selenium, zinc, and iron. Macronutrients consist of calcium, chlorine, potassium, sodium, and phosphorous. Carbohydrates, fats, and proteins are also major macronutrients that provide an energy source for animals. There are about 15 minerals that are essential for ruminant animals.

Alcohol fermentation is done by yeast and some kinds of bacteria. Microorganisms convert livestock feed to sugars, ethyl alcohol, nutrient rich residues and carbon dioxide. It begins after glucose enters the cell. In this research, quantity of nutrients in livestock feed obtained by alcohol fermentation will be determined. We shall also determine the quantity of nutrients from the non-fermented feed. Livestock feed obtained from these farms will be tested for crude protein, TDN (Total Digestible Nutrients), Calcium, and Phosphorus. Other parameters include ADF (Acid Detergent), NEL (Net Energy-Lactation), NEG (Net Energy- Gain), NEM (Net Energy-Maintenance), will also be tested.

Nutrient deficiency is the lack of one or more nutrients, which prevents normal growth. Calcium and phosphorus are major minerals constituents of bones. Calcium also plays an important role in muscle function, whereas phosphorus is also key to major metabolic functions throughout the body. Although calcium deficiency is not very common in animals, this deficiency can cause abnormal bone growth and reduce milk production. Phosphorus deficiency can result into poor reproductive

performance resulting in irregular heat cycles and reduced fertility (Ward, 2005). In addition to determining the quantity of nutrients obtained from either alcohol fermentation or non-fermentation process, we shall also assess if the lack of any nutrients had an impact on farm productivity. Weights of the cattle will be obtained with the different livestock feed that they consume.

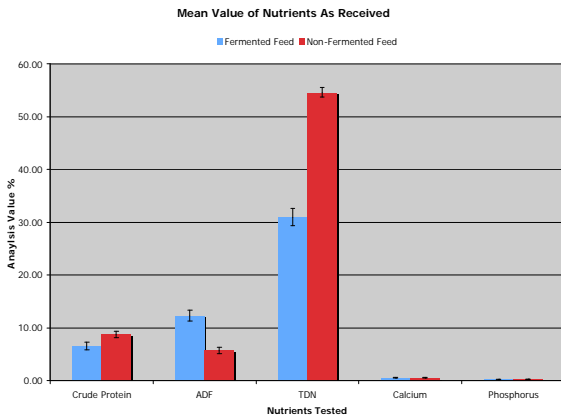
### MATERIALS AND METHODS

Obtain livestock feed from different farms that contains fermented and other non-fermented feed. The fermented feed farm used in this experiment was a farm local here in McPherson run by Jeff Kruse. This feed contained ground hay, ground corn, silage, and other minerals. All this is mixed with wet distillers. The non-fermented feed farm used was the McPherson County Feeders. This feed contained corn, corn silage, pizza crust, and protein supplement.

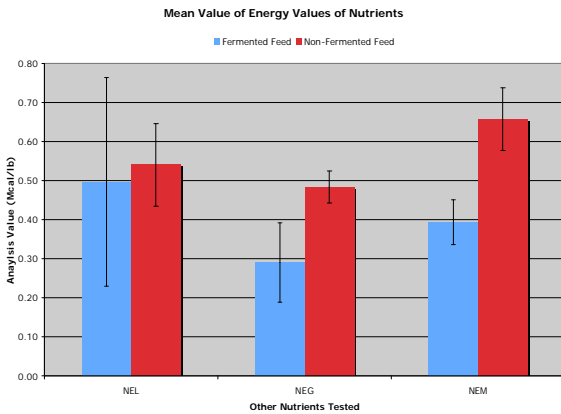
Cattle from two different farms were fed with livestock feed either obtained from fermented process or from non-fermented process. In the fermented feed process, Jeff's cattle were fed approximately 5-10 pounds of feed a day. The calves were also about a year old. In the non-fermented feed group (McPherson County Feeders), the cattle were about two years old and were fed twice a day. The growth rate of the cattle was determined by measuring the starting weight of the cattle and the final weight of each farm and divided the difference of that by eight which gave me the growth rate per week (time of study, which was eight weeks). The livestock feeds were determined through a commercial laboratory analysis.

**RESULTS**

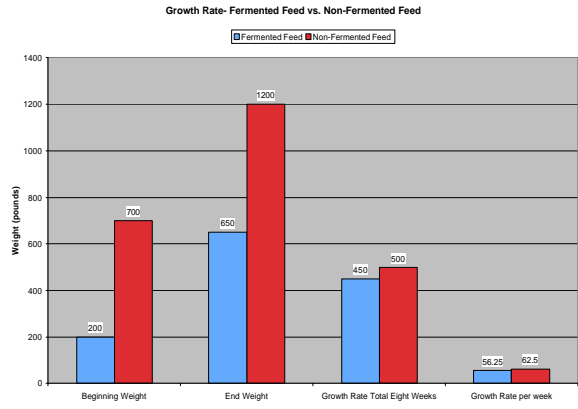
In Figure 1, the non-fermented farm has a higher amount of TDN (Total Digestible Nutrients) and crude protein than the fermented farm. The fermented farm's feed had a higher content of ADF (Acid Detergent) than the non-fermented feed. In Figure 2, the non-fermented farm's feed had higher values in all energy values of nutrients (NEL, NEG, and NEM). The standard deviation of nutrients was significantly higher including a high variability in the data. In Figure 3, the starting and ending weights of the non-fermented farm and the fermented farm are different because of the age difference in the cattle. In the eight-week period, cattle fed on non-fermented feed had a higher weight gain in pounds per week than cattle fed on fermented feed.



**Figure 1:** Mean value of nutrients tested as received from two different farms with their standard deviation



**Figure 2:** Mean energy value of nutrients from two different farms with their standard deviation



**Figure 3:** Weight and growth rates values from the two farms in an eight-week period.

**DISCUSSION**

Based on the results, cattle fed on non-fermented obtained more nutrients with higher energy values as seen in Figure 1 and 2. This would also explain why cattle fed the non-fermented livestock had a higher weight gain (Figure 3).

The ADF value was however higher in the fermented farm than in the non-fermented feed (Figure 1). This is expected because ADF measures the levels of nutrients that are NOT available for uptake. The higher the ADF value, the lower the total available nutrients.

In addition, in order to determine the productivity issues associated with each of these farms, general questions were asked about overall health of the cattle. In the fermented and non-fermented farm, no significant health issues were noticed. However, cattle in the fermented feed tended to consume too much diet per feeding routine. I would suggest feeding the fermented feed two to three times a day instead of once a day could probably reduce problems associated with over-consumption. For the future, I would say that researchers could probably use more than two farms to get better results.

**ACKNOWLEDGEMENTS**

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