IN VIVO AND IN VITRO EVALUATION OF IMMATURE SORGHUM GRAIN FOR POULTRY

by

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INTRODUCTION

Sorghum (Sorghum bicolor) is a popular multipurpose crop grown on all six populated continents. Originating in what is now Ethipoia and the Sudan, it is consumed by animals and humans as a cereal or fermented to be drunk as a beverage. Some varieties are raised to produce sugar and syrup; others provide forage and silage for livestock. Some are weeds.

In the United States the production of grain sorghum has increased rapidly since 1940. Between 1940 and 1968 the average yield rose seven-fold. In 1956, the crop was 170 million bushels; in 1976 the crop approached 710 million bushels. Between 1956 and 1976 the production in Kansas increased from 2,440,000 bushels to 153,750,000 bushels (1,2).

The reason for sorghum's success in cattle feeding areas such as Texas, Oklahoma and Kansas is its tolerance to adverse growing conditions in these areas. It thrives on less water than corn requires, making it a suitable crop for nonirrigated areas of the Southwest. Hybrids now available make it easier to suit the maturity time, insect and disease tolerance and other plant characteristics to the particular growing area.

Yet with all the advantages of the crop, an early freeze, delays in planting due to drought, muddy fields, or field infestations of any sort may result in a harvest of lower quality, low test weight sorghum. Such grain is discounted when sold, but little is known of the actual nutritive value. There is conflicting evidence as to the availability of the protein and to the amino acid balance. The information as to the energy availability is also limited.

The most common method of determining food value of grain is with animal feeding trials. These are difficult, entailing large numbers of animals for most accurate results, large sample sizes, and relatively long periods of time. This makes it impractical for the feeder or mill operator to evaluate grains prior to use.

In vitro tests are employed by some researchers in an attempt to cut the time and space required for feed evaluation. There are currently several in vitro tests which correlate well with ruminant nutrition, but few tests correlating to poultry, swine, humans and other monogastric animals exist.

This was the purpose of the study: to develop an in vitro test which could, when applied to feeds, give reasonable estimates of the protein, total dry matter, and energy digestibility for monogastrics. Such a test should correlate well with animal growth studies. Tests should then be applied to sorghums of different maturities to study possible differences in their nutritive values.