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# Sorghum: A Substitute for Maize in the West Africa Poultry Industry



**The poultry revolution is one of the most dramatic changes accompanying higher income growth in the world including Africa**



**The superior nutritional value of sorghum grain as a substitute for maize in broiler and laying hen feed rations is evident**



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With the declining relative prices of chicken compared with other meats, poultry consumption per capita in the USA has been increasing, while that of other meats has been stagnant or declining. Similar developments are occurring in West Africa.

There is interest in substituting sorghum for maize in poultry rations, in the U.S. and in West Africa, for both broiler and egg production. In contrast to maize, which is a thirsty plant and requires large amounts of water, sorghum offers farmers the ability to grow a crop where other crops do not produce well. In Niger, West Africa, locally produced sorghum is generally less expensive than imported maize and should play an important role in diets for livestock and poultry. Yet poultry producers are fearful of sorghum-based diets because of misconceptions about the effect of tannins in sorghum on poultry.

INTSORMIL is dedicated to the promotion of sorghum as a feed for the West African poultry industry. To overcome the misconceptions poultry producers have regarding sorghum grain as a poultry feed, INTSORMIL sponsored activities were conducted in Niger by Kansas State University (KSU) scientists in collaboration with scientists of the National Institute for Agricultural Research (INRAN) in Niamey, Niger.

The two INTSORMIL activities conducted by KSU sorghum breeder, Mitch Tuinstra, and poultry nutritionist, Joe Hancock and their Nigerien graduate student Salissou Issa (from INRAN) were targeted towards increasing the value of sorghum as poultry feed. The objective of the studies was to determine the nutritional value of diets based on imported maize, local landrace sorghum and an improved sorghum variety in broiler chicks and laying hens.



Graduate student Souley Soumana, INRAN, Niger (C) and Nigerien farmers observing the grains of improved sorghum varieties

**INTSORMIL**



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The research was designed to answer the question: "Does sorghum have sufficient nutritional quality to be able to serve as a substitute for maize in Nigerien poultry feeding rations? To answer this question two activities were conducted in which imported maize was compared with locally grown sorghum grain. The activities determined the nutritional qualities of maize and sorghum as based on the (1) growth and carcass characteristics of broiler chicks and (2) growth and subsequent egg production of laying hens. Both activities were conducted in Niger.



Mitch Tuinstra, KSU breeder

### Broiler Chicks: Growth and Carcass Characteristics

One-day-old chicks (Arbor line) were used in a 60 day study to determine the effects of sorghum variety on the growth and the carcass characteristics. The control diet was maize-based with fishmeal and peanut cake used as the primary protein supplements. Sorghum was used to replace maize on a wt/wt basis. The treatments were (1) maize imported from Nigeria (control), (2) a locally adapted landrace sorghum variety (Mota Galmi) and (3) a locally grown, improved sorghum variety (IRAT 204).



Joe Hancock, KSU nutritionist

Data obtained were the average daily gain (ADG) of the chicks, gain in weight of chicks to feed weight ratio (G:F), average daily food intake (ADFI) in g/day, carcass weight, carcass yield and carcass fat.

What did Salissou and his KSU colleagues find? Basically, that sorghum was equal to maize as measured by the carcass weight, carcass yield and carcass fat of the broilers at the end of the 60 day feeding period. The nutritional value of the IRAT 204 sorghum and the maize were also similar in regard to ADG, ADFI and G:F with the locally adapted landrace sorghum Mota Galmi being superior to maize and IRAT 204.

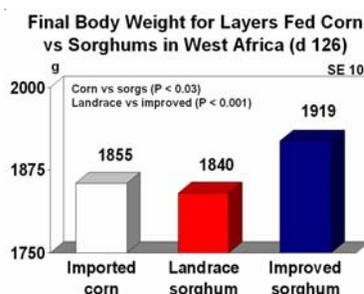


Souley Soumana, INRAN

### Laying Hens: Growth and Egg Production

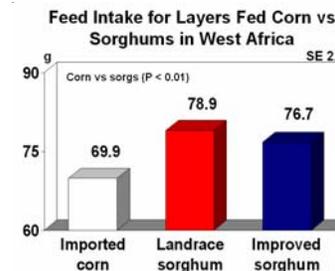
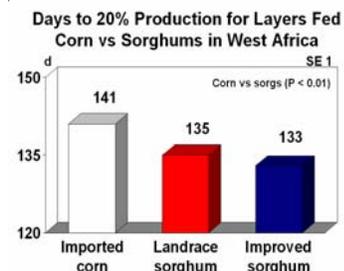
One-day-old layer chicks (Harco line) were used in an 18 month study to determine the effects of maize and sorghum variety on growth and egg production. The treatments were the same as those used in the broiler chick study. At the end of the 18 month feeding period hens fed the improved sorghum had the highest final body weight, being 79 g heavier than those fed the landrace sorghum, and 64 g more than the hens fed maize (right figure).

For the egg laying period, birds fed sorghum grains took fewer days to



come into production, ate more feed and produced more eggs. Days to 20% production for laying hens fed improved sorghum was 133 compared to 141 days for those fed maize (right figure).

Feed intake for the layers fed sorghum was higher than for those fed maize at 76.7 g/



day for improved sorghum compared to 69.9 g/day for the maize (figure below).

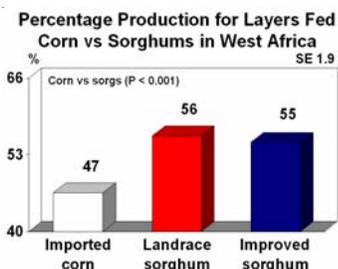
Percentage egg production was higher for hens fed sorghum than for those fed maize. Egg production was 55% for hens feeding on the improved sorghum and

only 47% for those feeding on the imported maize (figure below).

### Misconceptions Unfounded

The misconceptions of the Nigerien poultry producers regarding sorghum as poultry feed are unfounded. The superior value of sorghum grain as a substitute for maize in broiler and poultry rations is evident in the results of this study.

The two research activities clearly suggest that Nigerien poultry producers must seriously consider the use of local sorghums rather than imported maize as a component in their poultry rations. This study supports the INTSORMIL/INRAN recommendations of using sorghum as a substitute for maize in the burgeoning poultry industry in Niger and all of West Africa where sorghum is more productive than maize under the harsh, dry growing conditions and is a locally grown crop which need not be imported.



Poultry barn (upper) and laying hens feeding on a sorghum-based ration (lower) in Niger



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