

# ***Sorghum: A potential climate smart and resilient feed ingredient in broiler diets in Malawi***

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# Introduction

- Broiler production is one of the commonest poultry production enterprises at both large and medium scale in Malawi
- Malawi has an estimated chicken population of **100,736,324**
- Broiler come second to indigenous chickens among the poultry population

# Poultry Populations in Malawi

Source: Agricultural Production Estimates (APES), Dept. of Animal health and Livestock Development, 2017

Type of Poultry	Number-2015/16	Numbers-2016/17
All chickens	86,772,271	100,736,324
Indigenous Chickens	43,497,855	49,889,151
<b>Broilers</b>	<b>35,439,568</b>	<b>42,706,366</b>
Layers	7,834,848	8,141,307
Dual purpose: Black Australorp	1,205,413	1,399,040
Guinea Fowls	1,841,682	1,949,011
Turkeys	245,492	263,132
Ducks	2,062,608	2,279,404
Doves/pigeons	4,932,076	6,087,529

# Introduction Continued

- In Malawi, the main energy feed ingredient in broiler diets is maize
- Maize is also the staple crop hence a competition of its use as food or feed
- The competition becomes more fierce with recent low production of maize and inconsistent yields
  - >>>drought
  - >>>>pest outbreaks such as the Fall Army Worm
- In 2017, FEWSNET reported that dry spells and pest attacks could lead to 10% lower maize yields than in 2016 or 5 percent less than the five-year average and national cereal requirements

# Problem statement

- Despite Malawi experiencing low maize yields, the poultry industry continues to use maize as the SOLE and major energy feed ingredient in poultry diets
- Increasing pressure on maize supply and competition with humans increases maize prices making broiler meat unaffordable to the majority
- Hence need to look for alternative sources of feed ingredients to replace maize.

# Why Sorghum?

- Less competition with humans- Malawians prefer maize to other grains as staple food
- Sorghum is more drought resistant than maize, hence assurance of its supply during dry spells or droughts
  - In 2014, sorghum yields reduced by 8% while maize reduced by 30% due to dry spells.
- Replacement of maize with sorghum has also been shown to have no detrimental effects on daily weight gains or carcass characteristics in pigs in Malawi (Mwale, 2000).
- Sorghum is also already used in other countries as a poultry feed ingredient
- However, there is no empirical and contextualized evidence on use of sorghum in broiler diets in Malawi

# Objectives

- **Main Objective**
  - To evaluate the effect of graded replacement levels of maize with sorghum on growth performance of broilers
- **Specific Objectives:**
  - To assess effect of graded replacement levels of maize with sorghum on broiler growth performance and carcass characteristics.
  - To determine the optimal level of replacement.
  - To evaluate the cost effectiveness of including sorghum in broiler diets.
  - To determine the digestibility of broilers fed different sorghum inclusion levels.

# Methodology

- Study Location: Bunda Students Livestock Farm
- Birds: Ross broilers
- Type of Sorghum: Pilira 1 variety ( white-low tannin variety), ICRISAT, Chitedze Agricultural Research Station
- Chemical analyses: Proximate analysis: Dry Matter, Crude Protein, Crude Fibre, Ash, ME (AOAC, 2012)



# Methodology-Treatments

- **0% Sorghum (100% maize as energy feed source)**
- **10% Sorghum**
- **20% Sorghum**
- **30% Sorghum**
- **0% Maize (100% Sorghum as energy feed source)**

# Treatments: 22% Starter diet

Ingredient, %	T1	T2	T3	T4	T5
MAIZE	41.23	33.03	24.87	16.69	0
<b>SORGHUM</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>30.00</b>	<b>50.41</b>
SOYABEAN	54.59	52.79	50.95	49.13	45.41
LIME	2	2	2	2.00	2.00
MCP	1.38	1.38	1.38	1.38	1.38
LYSINE	0.1	0.1	0.1	0.10	0.10
METHIONINE	0.1	0.1	0.1	0.10	0.10
V.PREMIX	0.3	0.3	0.3	0.30	0.30

# Treatments: 17% finisher diet

Ingredient, %	T1	T2	T3	T4	T5
MAIZE	64.82	56.63	48.45	40.27	0
<b>SORGHUM</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>79.23</b>
SOYABEAN	31.16	29.34	27.53	25.71	16.74
LIME	1.73	1.73	1.73	1.73	1.73
MCP	1.39	1.39	1.39	1.39	1.39
LYSINE	0.15	0.15	0.15	0.15	0.15
METHIONINE	0.15	0.15	0.15	0.15	0.15
V.PREMIX	0.30	0.30	0.30	0.30	0.30

# Research protocol

- **300 Ross day old chicks, Kamponji**
- **Each treatment had 4 replicates with 15 birds per replicate at density of 10 birds/sq. metre**
- **Data collection started from 7-56 days of age.**
- **Feed and water provided ad libitum**
- **Weekly weights and feed intake measured**
- **Data were analyzed as CRD using Genstat software.**

# Proximate composition of key ingredients

	Dry matter, %	Crude protein, %	Crude Fibre, %
Soybean meal	89.99	35.05	4.6
Maize meal	89.71	9.38	3.1
Sorghum meal	92.41	14.05	2.29
Sorghum values ranges (Queiroz et al, 2015)		8.6-18.9	9.3-25.2

# Effect of different sorghum inclusion levels on growth performance of Ross broilers

Treatment	Init. Weight, g	Day 42 Bwt, g	Bwt. Gain, g	Feed intake, g	FCR, g:g
0% Sorghum	37.74	2144 <sup>a</sup>	2106 <sup>a</sup>	4301 <sup>a</sup>	2.02 <sup>a</sup>
10% Sorghum	37.25	2101 <sup>a</sup>	2064 <sup>a</sup>	4432 <sup>ab</sup>	2.11 <sup>a</sup>
20% Sorghum	37.39	2098 <sup>ab</sup>	2060 <sup>a</sup>	4531 <sup>b</sup>	2.16 <sup>ab</sup>
30% Sorghum	37.17	1982 <sup>b</sup>	1945 <sup>b</sup>	4480 <sup>b</sup>	2.28 <sup>b</sup>
0% Maize	37.57	1796 <sup>c</sup>	1758 <sup>c</sup>	4415 <sup>b</sup>	2.46 <sup>c</sup>
SEM	0.76	48		124	0.33

a-c Means with different scripts are significantly different, P<0.05)

# Effect of different sorghum inclusion levels on carcass characteristics and digestibility

Treatment	Dressing %	Breast as % of dressed weight	Thigh as % of body weight	Digestibility,%
0% Sorghum	74.12 <sup>a</sup>	22.36 <sup>a</sup>	13.10	76.81 <sup>a</sup>
10% Sorghum	72.13 <sup>ab</sup>	21.97 <sup>a</sup>	12.98	75.23 <sup>a</sup>
20% Sorghum	73.79 <sup>a</sup>	22.01 <sup>a</sup>	12.22	75.01 <sup>a</sup>
30% Sorghum	71.02 <sup>b</sup>	21.54 <sup>a</sup>	12.26	72.56 <sup>b</sup>
0% Maize	70.62 <sup>c</sup>	20.12 <sup>b</sup>	11.97	69.05 <sup>b</sup>
SEM	2.36	1.73	0.23	0.33

a-b Means with different scripts are significantly different, P<0.05

# Conclusion and way forward

- Preliminary results show that in Malawi, sorghum can be used as a potential replacement for maize as an energy source in broiler diets (optimum 20%).
  - Use of sorghum as feed can help create a ready market of sorghum for farmers
- More studies are required to test different sorghum varieties available in Malawi; different processing methods and replications for validation.



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