Digestion and carcass quality of growing rabbits fed molasses improved sorghum brewers dried grain (MISBDG)

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Abstract

The study evaluated the digestion and carcass quality of growing rabbits fed molasses improved sorghum brewer's dried grain (MISBDG). Forty mixed breeds of rabbits (4-6weeks) were allotted into four treatments in a completely randomized design. Four mash diets (T1, T2, T3 and T4) were formulated with inclusion of sorghum brewers dried grains at 0, 20, 30 and 40% levels respectively as well as addition of 10% molasses to diets containing sorghum brewers dried grains. The crude protein, ether extract, crude fibre and ash content of diets containing MISBDG were higher than the reference diet. There was no significant difference ($p>0.05$) in the digestible dry matter, digestible crude protein, digestible crude fibre and the digestible carbohydrate contents of the rabbits fed the experimental diets. The digestible ether extract content was highest in rabbits fed 20%MISBDG followed by 40%MISBDG, 0%MISBDG and 30%MISBDG. However, there were no significant differences ($p>0.05$) among the means of all the carcass quality parameters across the experimental diets fed to the rabbits. Therefore it could be concluded that addition of molasses to brewers dried grains in the diets of growing improved the nutrient content and digestibility as comparative carcass quality. Hence MISBDG could replace maize in the diets of growing rabbits.

Key words: Digestion; carcass quality; sorghum brewer waste; molasses; rabbits

Introduction

The rearing of micro-livestock species such as rabbits, considering the comparative advantage of these animals over large animals such as cattle, sheep, and goats should be encouraged in Nigeria (Akuru et al., 2021). These advantages range from minimal space requirement, low initial capital involvement, low labour demand, and quick high turn-over on investment (Oseni and Lukefahr 2014). Rabbits are herbivores with early maturity, short generation interval, high prolificacy, and ability to utilize forages that abound in rural communities (Dalle Zotte 2014). There are many constraints rabbit production under tropical conditions (Baruwa, 2014), Conventional feedstuffs like cereal grains and legumes are expensive and highly demanded by humans. Therefore, the search for alternative, cheap unconventional feed stuff to substitute in part or fully the conventional feed resources by animal nutritionists becomes very important. Adedokun and Ayandiran (2022) described agro-industrial by-products also known as waste products arising from the processing of crops or animals products usually by an agro-industrial firm. The production of sorghum brewers waste (SBW) is derived from sorghum used solely or in combination with other cereal grains in the production of burukutu (Ayodeji and Fasuyi 2005). Sorghum brewers dried grain does not require much of additional processing such as grinding before being incorporated into livestock diets. Ayandiran at al (2020) reported that sorghum brewers dried grain could replace maize up to 30% in the diets of growing rabbits. However, molasses being a ready source of soluble carbohydrate could improve and upgrade the nutrient content of sorghum brewer dried grains as well as have significant effect in the blood glucose content of animals (Adedokun and Ayandiran, 2022). Hence this study evaluated the nutrient digestibility and carcass quality of growing rabbits fed molasses improved sorghum brewers dried grains.

Materials and method

Experimental location and period

This study was conducted at the Department of Animal Health and Production Technology, The Oke Ogun Polytechnic, Saki Teaching and Research farm, located at the longitude 8.6275ºN and latitude 3.4058ºE. The experiment lasted for 10 weeks (2 weeks adaptation period, 8 weeks of feeding trial).

Processing of experimental diets

Fresh and wet local sorghum brewers wastes were sourced from reputable local brewery in Saki metropolis, sun-dried on a concrete floor for three days and stored in polythene bags for subsequent use. Four experimental diets (T1, T2, T3 and T4) were formulated with inclusion of sorghum brewers dried grains at 0, 20, 30 and 40% levels respectively as well as addition of 10% molasses to the diets containing sorghum brewers dried grains (Table 1). The experimental diets were pelleted and formulated to meet the recommended nutrient requirements of growing rabbits according to Lebas (2004)

Management of rabbit

Forty mixed breeds of growing rabbits aged 4 - 6 weeks of age were used for the experiment. The rabbits were housed individually in iron net cages netted with wire mesh measuring 23 x 18 x 15 inch in dimension. There was a two-week adaptation period during which the rabbits were treated against parasitic infestation with ivermectin subcutaneous and multivitamin added to their water. Feed were been supplied to the animal every morning throughout the experimental periods. Each of the animals was weighed before the commencement of the experimental and subsequently during the experimental period. The left-over feed was weighed to estimate the feed intake from the feed offered.

Experimental design and data analysis

The experiment was laid out in a complete randomized design. A total of 40 mixed breeds of growing rabbits were randomly allotted to four treatments at 10 rabbits per treatments and each rabbit acted as a replicate. Data collected were subjected to one way analyses of variance procedure of the general linear model (SAS, 2008) the mean were separated using the Duncan multiple range test.

Digestibility trial

At 7^{th} week of the experiment, Animals were kept in metabolism cages for easy collection of faeces and urine. The daily faeces voided daily were weighed. Samples of faeces voided per day were dried in a forced-dought oven 70c for 24 hours. The stored samples of faeces were bulked, thoroughly mixed ground and sub-sample for the chemical analysis. The faecal output was collected and used to calculate apparent digestibility co-efficient of nutrient.

Chemical Analysis

Proximate composition of the experimental diets and faeces were done in the laboratory using the procedure of AOAC (2000).

Determination of carcass quality of rabbit

At the end of the experiment, the selected rabbits from each treatment were slaughtered through the cervica dislocation for carcass analysis using the method of Odeyinka*et al* (2007). The skin, head, forelimb, hindlimb, kidney fat, intestine, liver, lungs and heart were removed and weighed (Odeyinka *et al*., 2007).

The dry matter content of the experimental diets was relatively similar across all the diets (Table 2). The crude protein, ether extract, crude fibre and ash content of diets containing MISBDG were higher than the reference diet. The carbohydrate fraction of MISBDG based diets in this study decreased as the level of inclusion increased. Hence, the carbohydrate fraction of the T1 (53.69%) diets was higher than diets containing MISBDG (44.95, 43.49 and 40.64%). The crude protein of diets containing MISBDG in this study was higher than 19.77% reported by Igwebuike et al (2013) for growing rabbits fed two varieties of sorghum as replacement for maize. The ether extract in this study was higher than 8.1 – 10.8% recorded by Ayandiran et al (2021) for rabbits fed sorghum brewers dried grains. Furthermore, the crude fibre content of diets in this study was lower than 16 – 18.20% reported for sorghum milling dust (Njoku et al., 2013) but similar to report of Kehinde (2014) for enzyme supplemented sorghum brewers waste. The carbohydrate fraction in this study was higher than 34.41 – 42.83 reported for sorghum brewers dried grains Makinde (2019). This might be the evidence of the molasses which probably increased the carbohydrate fraction (Adedokun and Ayandiran 2022).

There was no significant difference ($p>0.05$) in the digestible dry matter, digestible crude protein, digestible crude fibre and the digestible carbohydrate contents of the rabbits fed the experimental diets (Table 3). The digestible ether extract content was highest in rabbits fed 20%MISBDG followed by 40%MISBDG, 0%MISBDG and 30%MISBDG. However, rabbits fed diets containing MISBDG had significantly higher ($p<0.05$) digestible ash content compared to other diet. The digestible dry matter, digestible crude protein and digestible crude fibre contents in this study were all higher than values reported by Ayandiran et al (2021) for digestibility coefficients of weaner rabbits fed sorghum brewers dried grains. The digestible ether extract values recorded in this study was higher than the range reported by Igwebuike et al. (2013) for rabbits fed sorghum as a replacement for maize. Also the digestible carbohydrate fraction in this study was higher than 39.67-72.77 for weaner rabbits fed graded levels of cowpea hull meal (Akuru, 2021). However, it could be suggested that the inclusion of molasses into sorghum brewers dried grains diets increased the nutrient digestibility of the experimental rabbits in this study.

Table 1: Gross compositions of experimental diets

Ingredients	0%MISBDG	20%MISBDG	30%MISBDG	40%MISBDG
Maize	40.0	20.0	10.0	
SBDG	-	20.0	30.0	40.0
Molasses	-	10.0	1.0	10.0
Wheat offal	11.50	11.50	11.50	11.50
G.N.C.	25.0	25.0	25.0	
P.K.C.	10.0	10.0	10.0	10.0
Bone meal	2.0	2.0	2.0	2.0
Lysine	0.25	0.25	0.25	0.25
methionine	0.25	0.25	0.25	0.25
Salt	0.5	0.5	0.5	0.5
Vital premix	0.5	0.5	0.5	0.5
Total	100	100	100	100

Premix provided per kg diet: vitamin A, 12,000 IU; vitamin D3, 1,000 IU; vitamin E acetate, 50 mg; vitamin K3, 2 mg; biotin, 0.1 mg; Fe, 100 mg; Cu, 20 mg; Mn, 50 mg; Co, 2 mg; I, 1 mg; Zn, 100 mg; Se, 0.1 mg; Robenidine, 66 mg. GNC: Groundnut cake, PKC: Parm kernel cake

Table 2: Proximate components of the experimented diets fed to growing rabbits

Parameters	0%MISBDG	20%MISBDG	30%MISBDG	40%MISBDG
Dry matter	94.50	93.90	94.70	94.20
Crude protein	17.04	20.34	21.96	24.19
Ether extract	3.67	5.67	5.77	6.10
Crude fibre	13.04	14.30	14.02	15.91
Ash	7.16	8.64	9.46	7.36
Carbohydrates	53.69	44.95	43.49	40.64

Table 3: Digestibility coefficients of growing rabbits fed Molasses improved Sorghum Brewers Grain

Parameters	0%SBDG	20%SBDG	30%SBDG	40%SBDG	SEM	P VALUE
DDM	79.68	83.69	83.55	89.84	2.68	0.7177
DCP	92.96	93.10	88.68	93.11	0.89	0.1801
DEE	87.26[b]	90.88[a]	84.39[c]	88.07[b]	0.91	0.0091
DCF	68.09	75.84	81.75	79.84	2.49	0.2216
DASH	62.15[b]	75.57[a]	71.34[a]	74.58[a]	2.13	0.0243
DCHO	89.11	93.37	82.63	88.99	1.46	0.008

DDM: Digestible dry matter, DCP: Digestible crude protein, DEE: Digestible Ether extract, DCF: Digestible crude fibre, DASH: Digestible ash, DCHO: Digestible carbohydrate fraction

Table 4: Carcass quality of weaner rabbit fed molasses improved sorghum brewer's dried grain.

Parameter (%)	T1	T2	T3	T4	SEM	P.Value
Live weight	1729.60	1639.40	1660.20	1714.20	67.74	0.9667
Hot carcass weight (g)	519	398	442.5	511.5	34.99	0.3232
Dressing	48.61	41.72	40.04	45.82	1.57	0.1906
Head	10.48	10.03	10.72	12.03	0.52	0.6794
Tail	0.3	0.27	0.19	0.31	10.03	0.6757
Skin	7.27	7.31	7.32	6.91	0.22	0.9377
Feet	2.72	2.84	3.04	2.92	0.15	0.9377
Forelimb	7.6	6.77	6.31	7.05	0.24	0.3322
Hindlimb	13.95	12.46	11.82	13.72	0.49	0.4586
Thorax	9.42	8.82	9.04	9.83	0.21	0.4197
Stomach	7.04	7.76	8.05	6.8	0.32	0.5651
Liver	2.21	2.36	2.72	2.9	0.14	0.3022
Kidney	0.54	0.63	0.69	0.62	0.03	0.2061
Lungs	0.58	0.58	0.57	0.49	0.04	0.8633
Heart	0.38	0.27	0.19	0.23	0.03	0.2218
Abdomen	17.66	13.77	12.52	15.28	0.81	0.0694

There were no significant differences ($p>0.05$) among the means of all the carcass characteristics parameters across the experimental diets fed to the rabbits (Table 4). The results in this study indicated that the dressing percentage in this study was less than 50.03-58.51 while the head values were higher than those reported by Olafadehan (2011). The liver and the kidney are involved in the elimination of toxins and metabolic wastes from animal's body (Onyeyilli et al., 1998). Hypertrophy or hypotrophy of these two organs has been linked with the presence of toxins (Ewuola et al., 2003). The values obtained for the internal offals in this study were within the normal range, hence indicating that there were no abnormalities or pathological lesions in these organs, thus confirming no toxicity in the treatment diets (Ayandiran et al., 2019). The dressing percentage was comparable to values obtained in the studies reported by Abegunde et al (2014) and Olajide et al (2016). The fore and hind limbs in this study were higher than values reported by Olajide and Garus-Alaka (2018) for rabbits fed mulberry leaf meal as replacement for soybean meal.

Conclusion

Therefore it could be concluded that addition of molasses to brewers dried grains in the diets of growing improved the nutrient content and digestibility as comparative carcass quality and MISBDG could replace maize in the diets of growing rabbits.

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