
PHYSICOCHEMICAL PROPERTIES AND PROXIMATE COMPOSITION OF *PANICUM MAXIMUM* FERMENTED WITH FUNGI (*SACCHAROMYCES CEREVISIAE*) AND MOLASSES

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ABSTRACT

Fortification of quality ruminant feed with yeast plays a profound role in improving the physical appearance and proximate compositions of feed thereby promoting feed intake, utilization and ruminant productivity. A total number of 12 empty Bamma bottles was randomly divided into four (4) Treatments containing 50g of *Panicum maximum* each and replicated into three (3) in a Completely Randomized Design (CRD). Treatment one composed 0 g of *Saccharomyces cerevisiae* + 20 mL Molasses. While, 2.5g, 5g, and 7.5g, *Saccharomyces cerevisiae* and molasses 20 mL each treatment as T2, T3 and T4 respectively. The fortified Bottles were kept at a room temperature for a period of 10 days. The fermented samples were opened after 10 days. Samples were taken to the laboratory for physical and chemical analyses, dried under a shed for a period of 2 hours and offered to goats to assess their feeding behaviour. The results revealed that *Panicum maximum* fermented with *Saccharomyces cerevisiae* significantly ($p < 0.05$) affected the pH and changed the odour, texture and colour of *Panicum maximum*. *Panicum maximum* fermented with 7.5g *Saccharomyces cerevisiae* + 20 mL molasses (T4) had the highest crude protein and ether extract contents. Similarly, feeding behavior of the goats to the diets in terms of eating, sniffing, snorting and vocalization were higher for T4. In conclusion, *Saccharomyces cerevisiae* and molasses improved the physicochemical properties and proximate composition of fermented *Panicum maximum*.

Keywords: Fermentation, Fungi, *Panicum maximum*

INTRODUCTION

The ability of ruminant to use fibrous materials a wide available resources matched with the sharp increase in the population mainly in developing countries and therefore increasing the demand for food. In opposition to that in many developed gastric and ruminant animal feeding. As such, ruminant should be fed as far as possible on roughages and other feeds that are not in competition with human food (Onwih *et al.*, 2021).

Yeast supplementation in diets of ruminants is one of the options to increase the utilization of poor quality roughages, grains and by-product-based diets (Shriver-Munsch, 2011). Previous researchers (Moallem *et al.*, 2009) outlined some benefits of live yeast supplementation to increase milk yield, milk protein, fibre digestion and stabilization of rumen pH in dairy cattle. Yeast is believed to improve the performance of ruminant by encouraging the growth of fibre digesting microbes (Dias *et al.*, 2018). In addition, active yeast has the potential to stimulate the proliferation of cellulolytic bacteria and lactate-utilizing bacteria resulting in increased feed intake, reduced frequency of diarrhea, increased animal performance, and improved stability of rumen (Galvao *et al.*, 2005). Addition live yeast to diets may balance the rumen ecosystem and increase the cellulolytic bacteria numbers in cattle (Alzahal *et al.*, 2007) and sheep (Mosoni *et al.*, 2007). The objectives of this study was to determine the effect of treatment of *Panicum maximum* with fungi and molasses on physicochemical, proximate composition and feeding behavior of Red Sokoto goats.

MATERIALS AND METHODS

The experiment was conducted at the Pasture Unit of Prof. Lawal Abdu Saulawa Livestock Teaching and Research Farm, Department of Animal Science, Federal University Dutsin-ma Katsina State. The farm is situated within the latitude 12°27'18" North and 7°29'29" East and 605 meters above sea level with an annual average rainfall of 700 mm and situated in the Northern Sudan Savannah zone (Gaddafi *et al.*, 2019). A total number of 12 empty Bamma bottles were filled with 50 g of *Panicum maximum* were randomly divided into four (4) Treatments comprising; T1 (0 g *Saccharomyces cerevisiae* + 20 mL Molasses), T2 (2.5 g *Saccharomyces cerevisiae* + 20 mL Molasses), T3 (5 g

Saccharomyces cerevisiae + 20 mL Molasses) and T4 (7.5 g *Saccharomyces cerevisiae* + 20 mL Molasses) in a Completely Randomized Design (CRD). The fortified Bottles was kept at a room for a period of 10 days. The fermented samples after 10 Days were opened and dried under a shade for a period of 2 hours and given to Goats for feeding behavior determination according to focal observation techniques. Fermented samples after opening were taken to the laboratory for analysis of the physicochemical properties and proximate composition.

RESULTS AND DISCUSSION

Physicochemical properties of *Panicum maximum* fermented with *Saccharomyces cerevisiae*

The pH values (Table 1) of fermented *P. maximum* were significantly ($p < 0.05$) different, and ranged from 4.875 in T1 to 5.615 for T2. Variation in the pH values may be attributed to the fermentative activities of the fungi, *Saccharomyces cerevisiae*. The result further indicated that fortification of *Panicum maximum* hay with *Saccharomyces cerevisiae* in combination with molasses turn to change the colour from light brown to brown and dark-brown colour. Increases level of *Saccharomyces cerevisiae* in *Panicum maximum* fortification alter the odour characteristics from very sweet odour to pleasant odour while very soft texture characteristics was observed in T4 while moderately soft was recorded in T1. The very soft texture may likely make the *Panicum maximum* more palatable and attractive the animals.

Table 1: Physicochemical properties of *Panicum maximum* fermented with *Saccharomyces cerevisiae* and molasses

Parameters	T1	T2	T3	T4	SEM	LOS
pH	4.875 ^c	5.615 ^a	5.600 ^a	5.405 ^b	0.017	*
Temperature (°C)	29.200	29.400	29.400	29.150	0.117	NS
Colour	Light brown	Brown	Dark brown	Dark brown	-	-
Odour	Very sweet odour	Very sweet odour	Sweet odour	Pleasant odour	-	-
Texture	Moderately soft	Soft	Soft	Very Soft	-	-

The proximate composition of *Panicum maximum* fermented h *Saccharomyces cerevisiae* and molasses is presented in Table 2. The dry matter content indicated no significant ($P < 0.05$) differences while significant ($P < 0.05$) differences were recorded in ash, ether extract, crude fiber, nitrogen and crude protein of *Panicum maximum* fortified with varying levels of *saccharomyces cerevisiae* in which higher crude protein, nitrogen and ether extract content were found in T4 while Ash content were higher in T3. The result further showed that T2 had significantly ($P < 0.05$) higher crude fibre. This increases of crude protein and ether extract with increased levels of addition of *Saccharomyces cerevisiae* may be attributed to the role of yeast in increasing utilization and palatability of ruminant diets as reported by Shriver-Munsch, (2011).

Table 2: Proximate compositions of *Panicum maximum* fermented with *Saccharomyces cerevisiae* and molasses

Parameters	T1	T2	T3	T4	SEM	LOS
Dry matter	94.545	94.065	94.065	93.570	0.371	NS
Ash	7.015 ^a	5.200 ^b	7.450 ^a	6.715 ^a	0.199	*
Ether extract	1.395 ^{ab}	1.300 ^b	1.415 ^{ab}	1.570 ^a	0.045	*
Crude Fiber	30.045 ^b	32.670 ^a	29.430 ^b	30.195 ^b	0.353	*
Nitrogen	0.850 ^c	0.890 ^c	1.135 ^b	1.290 ^a	0.036	*
Crude Protein	5.310 ^c	5.560 ^c	7.090 ^b	8.060 ^a	0.277	*

^{abc}= Means with.....

Feeding behaviour of goats offered *Panicum maximum* fermented with *saccharomyces cerevisiae* shown in Table 3 revealed that eating was the most observed behavioural activity. This may be due to palatability improvement, which triggers eating. Sniffing by goats was observed for T3 and T4. Goats, being a sensitive animal, the sniffing behaviour may be attributed to the instinct of using the sensory organoleptic organs in selecting delicious feed materials (Gaddafi, 2021) or otherwise.

Snorting is the type of vocalization exhibited by goats due to so many reasons of excitement, joyful moment or distress. However, the result in this study revealed high snorting in for T4. Vocalization was observed for T3 and T4, which is part of the characteristic feeding ethograms in goat. Trampling and urination are part of feed rejection behavior which were not observed in this study across the treatment groups in this study.

Table 3: Feeding Behavior Goat offered *Panicum maximum* fermented with *Saccharomyces cerevisiae* and molasses

Behaviour	T1	T2	T3	T4
Eating	+	++	++	++
Sniffing	-	-	++	++
Snorting	-	-	-	++
Vocalization	-	-	+	+
Trampling	-	-	-	-
Urination	-	-	-	-

++ = Highly observed, + = Observed, - = Not observed

CONCLUSION

It could be concluded that the physical and proximate composition of *Panicum maximum* improved when fermented with *saccharomyces cerevisiae* and molasses, hence, enhanced the feeding behavior of Red Sokoto Goats.

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