PROBIOTICS USE IN RUMINANT NUTRITION

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ABSTRACT
Ruminant production in very prominent in livestock production. They are available all over Nigeria where pasture constitute their major source of feed. However, utilization of the available pasture depends on the microbes in the rumen which then determines the overall wellbeing of these animals and their productive capacity. Additives have been used to improve the ability of these microbes to productively utilize the feedstuff and consequently, the digestibility. The additives in use previously have been demonstrated to impact negatively on the health of the animals. Probiotics then became prominent as an additives because of the ability to improve the productive capacity of the microbes in the rumen without any known negative effect on the health of the animals. The study then reviewed probiotics use in ruminants and concluded that it improves the productivity of ruminants due to improved microbial activities.

Keywords: Probiotics, ruminant, feed, microorganism, Nigeria

INTRODUCTION
Due to its multi-purpose functions, small ruminant production has been given a pride of place in animal production in Nigeria. This contributes greatly to Nigeria's animal protein potential (Aruwayo , 2018). It constitutes a profitable business for rural families and the success depends mainly on the feeding and feeding stuffs available and the efficiency with which the microbes in these animals ' digestive systems are mobilized and used to improve the digestibility and feed utilization. Abd El-Tawab *et al*. (2016) documented feed to be major a component of livestock production and that exemplary attention has been paid to improving animal output in its utilization capacity. Efforts being made to boost the use of feed which necessitated use of additives has proved to be one of the successful among other methods of improving feed utilization. This research paper dwelt on the effect of probiotics as a class of feed additives on productivity and health condition of ruminant livestock.

FEED ADDITIVES
McDonald *et al*. (2010) reported that feed additives are materials used to improve the usefulness of nutrients and to exert their effects on the animal intestines or on the gut wall cells. Fanelli (2012) has documented his intention to promote animal growth by increasing the quality and palatability of feed Chahal et al. (2008) reported that feed additives in feed for ruminants lead to improved production of animal protein for human consumption, thus reducing the cost of animal products. Feed additives used in feeds include antibiotics, probiotics, oligosaccharides, enzymes and organic acids. Antibiotics was one of the prominent additives used to improve the consumption of feed and increase production. Nevertheless, because of the recorded residue impact on livestock items, it gradually lost prominence because of the residue effect recorded on livestock products. Morril *et al.* (1977) stated that in the past, antibiotic growth promoters were commonly used as animal feed additives to improve feed intake, increase production, and prevent infections. Nevertheless, the use of antibiotics was banned which brought probiotics into the limelight and accepted that they were healthy for the animals. The term ' probiotics' was used by Lilly and Stillwell (1965) to identify growth enhancing substances generated by a ciliate protozoan which enhanced the growth of any other ciliate. Now, probiotics encompasses a far wider category of species. Probiotics was described as "species and compounds that promote intestinal microbial stability which include live and non living organisms (Parker, 1974).
The United Nations Joint Food and Agriculture Organization (FAO) and World Health Organization (

WHO) Working Group classified probiotics as ' live micro-organisms which endow advantages in health on the host when administered in sufficient quantities ' (FAO / WHO, 2001).

PROBIOTICS USE

Probiotics constitute viable microorganisms and, when used in large numbers (Rook and Burnet 2005), the microflora can transform the digestive system of ruminants, resulting in improved health and growth. They are living microbes and are feed supplements that are beneficial to the host through improvement of its microbial bowel balance. Such species are genetically robust, capable of producing antimicrobials and altering the colonic flora in favor of a healthy configuration and thus cause luminous or systemic effects that are useful for the health of the host (Kaur et al., 2002; Parvez *et al*., 2006). Bacteria and yeasts are significant probiotics used in the ruminant development. Probiotics have been used in ruminant diets for the improvement of the health, productivity and health of the animals.

It has also been documented that probiotics regulate rumen pH, increase the production of volatile fatty acids and promote protozoan use for lactic acid, resulting in highly efficient rumen work. Despite not being non-pathogenic to animals, microbes that are employed as probiotics are chosen considering their longevity in the gastro intestine along with their capacity to resist low pH and high levels of the bile acids. Furthermore, those selected strain can withstand processes of production, transport, storing and application, preserving the viability and desired features (Collins *et al*., 1998). The ability by the prospective probiotic micro-organisms geared towards resisting the digestive tract may be verified in vitro with low pH challenges (H) (Hood and Zoitola, 1988; Collado and Sanz, 2006). Their capacity to condone acidic environment and bile differs among strains (Mishra and Prasad, 2005). Additional attractive trait is the capacity to bind to the epithelium of the intestines facilitating colonization of the intestine by the probiotic strain(s) (Guarner and Schaafsma, 1998). Furthermore, the capacity of growing fast on cheap media becomes a necessary requirement (Collins, Thornton and Sullivan, 1998) in profitable production.

Probiotics can enhance the amount of helpful microbes plus lactobacilli and bifidobacteria, inhibiting the growth of deleterious microbes through the production of constraining substances like bacteria or/and organic acids. As a result, probiotic characteristics lead to improved animal health, increased productivity (Isolauri *et al*. 2004), and improved the immunity of the host (Patel *et al*., 2015).

Yeast feeding makes the rumen pH stable, raises total volatile fatty acids (VFAs) and decreases ammonia (Erasmus *et al*. 1992, Newbold *et al*. 1996, Abd El-Tawab 2007, Bakr *et al*. 2015). In addition, the probiotics use have been demonstrated to possess capacity to boost production of milk and may decrease those risk of neonatal diarrhea and mortality. Yeast utilization in the feed of rumen lowers the redox capacity which results in better situations for the growth of stringent anaerobic microorganisms, produces specific factors such as vitamin B12 or branched chain fatty acids, thus arousing microbial biomass production in the rumen (Jouany, 2006; Chaucheyras — Durand *et al*., 2008). In addition, rumen acidosis is decreased by yeast supplementation, promoting growth and operation of the lactic acid-using rumen bacterium Selenomonas ruminantium (Nisbet and Martin, 1991). Yeast operations also results in rumen fermentation stimulation and leads to enhanced digestibility and feed use. The enhanced bacterial population is fundamental to the yeast's operation in enhancing the productive capacity of ruminants (Wallace and Newbold 1992). Yeasts can promote cellulolytic bacteria's growing and enzymatic activity, and increase microbial protein production and fiber digestibility (Bomba *et al.* 2002).

Use of probiotic strains, both individual and combined, could have considerable effect on absorption and utilisation of feed, daily increase of body weight and total body weight of various animals, including sheep, goats (Chiofalo, 2004), cattle, and horses (de Rezende, 2012). An addition of probiotic microorganisms to feed results in improved quantity and quality of milk, meat and eggs. The efficacy of probiotics in combating diarrhea has been well studied. Recombined probiotics constitutes one of the most novel biomedical applications of genetically modified organisms (GMO) (Musa,2009). The absence of clinical side effects is an important benefit of probiotics. However, despite the fact that the micro-organisms used as probiotics in the feed of ruminants, there should be precaution in their use because some might be dangerous to animals, human beings and the environment.

CONCLUSION:

From this study, it was clearly shown that probiotics use in ruminants' has improved their utilization of feed. This is because probiotics enhance the capacity of the rumen microbes to utilize feed better in the rumen.

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RESULTS AND DISCUSSIONS

Figure 1 shows the shear force of spent layers' meat tendered with turmeric extract. As the levels of inclusions increased, the shear force value decreases. 15% of turmeric extract had the lowest shear force value while control without turmeric extract had the highest shear force values. The shear force values indicate tenderness of meat. When the value obtained is higher, it denotes that the meat will be tough but when the values obtained was lower, it shows that the meat will be tender. In this study a trend was observed in the shear force value of the meat. As the inclusion levels of turmeric extract increased, there was decrease in the shear forces. These results might be attributed to the effect of proteolytic enzyme found in the turmeric which may lead to more degradation and availability of dietary protein. Shear force values in our experiment are in agreement with Naveena *et al.,* 2004 reported significant reduction of shear force value in all enzyme treated samples compared to control. Similar result was also obtained in the work of Verma, *et al*. (2018).

The water holding capacity of meat from spent layer tendered with turmeric extract results was showed in Table 1. A consistent value was observed for water holding capacity. As the inclusion level increased, the water holding capacity increases. More so, the extract released volume result shows that the control had the lowest value of (17.50%) without turmeric extract while spent layer meat tendered with turmeric extract at 5% had the highest value of (43.75%). The water holding capacity (WHC) is the ability of meat to hold water after external pressure was applied. Turmeric treated sample had higher WHC than control which are in agreement with Naveena and Mendiratta (2001).

Extract released volume is a technique that is based on the volume of aqueous extract released by homogenate of meat when allow to pass through the filter paper for a given period of time, by this meat of good organoleptic and microbial quality release large volume of extract, whereas meat of poor quality releases smaller volume or none. The result obtained shows that as the inclusion level increased the meat organoleptic and microbial quality was improved. This could be due to phytochemical substances present in the turmeric extract.

The mean pH value was higher in meat from 15% turmeric extract while the control meat had the lowest pH value. The result obtained from pH.

CONCLUSION

In conclusion, spent layers meat can be marinated in turmeric extract up to 10 – 15% /L due to improvement of tenderness.

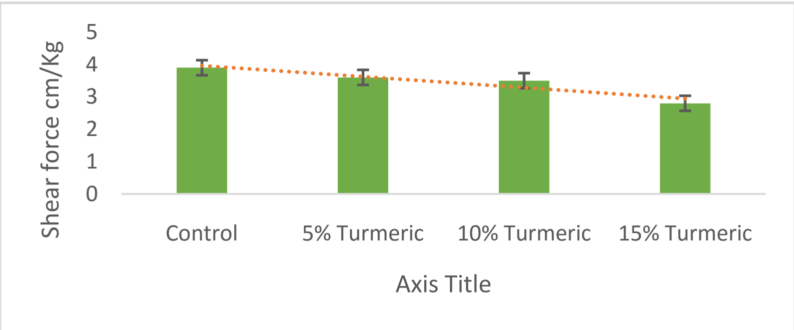

Figure 1: Shear force of the spent layer's meat tendered with turmeric extract

Table 1: Physical evaluation of spent layers meat tender with turmeric extract

Parameters	Control	5% Turmeric/L	10% Turmeric/L	15% Turmeric/L	SEM
Water holding capacity	33.33^{c}	68.33^{b}	70.00^{b}	85.83^{a}	5.8
Extract released volume	17.50^{c}	43.75^{a}	23.75^{b}	28.75^{b}	3.28
Ph	6.55^{b}	6.65^{ab}	6.65^{ab}	6.70^{a}	0.02

^{abc} Means on the same row with different superscripts are significantly different (p<0.05)

SEM= Standard Error mean

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