EFFECT OF GARLIC AND TIGER NUT ON THE MILK YIELD AND MILK COMPOSITION OF WEST AFRICAN DWARF GOAT DOES

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ABSTRACT

This study aims to investigate the effect of garlic and tiger nut on the milk yield, milk composition of West African Dwarf Does. A total of Fourteen (14) lactating West African Dwarf (WAD) Does in their fourth parity and their live weight ranged from 15kg to 28kg were distributed into seven treatments with two goats per treatment. Seven feed types were formulated to contain 0g/kg, 25g/kg, 50g/kg, 75g/kg of tiger nut powder per kilogram (kg) of feed and 25g/kg, 50g/kg, 75g/kg of garlic powder per kilogram (kg) of feed. Daily milk samples were analysed for fat, protein, SNF, density, lactose, salt, added water, temperature, pH, conductivity, freezing point in the laboratory using a Lactoscan. Feeds containing different levels of tiger nut and garlic did not significantly (P>0.05) influence the milk physico-chemical properties except milk yield and freezing point. Diet containing 50g/kg of garlic had the highest values in milk yield and milk composition. It is therefore recommended that diet containing 50g/kg of garlic should be offered to lactating West African Dwarf does to increase the milk yield and some physico-chemical properties of milk.

Keywords: West African Dwarf Does, Parity, Diets, Milk yield, Milk composition

INRODUCTION

Goats accounts for 30% of Africa's ruminant livestock and the population of goats in sub-Saharan Africa (SSA) is estimated at 506 million (AI overview, 2022). Sixty-four percent of the goats are found in the arid and semi-arid zones, sub-humid, humid and high lands (Makun 2013). They are either raised in a communal farming system or allowed to roam in search of feed. The ban on the use of synthetic antibiotics in feed by the European Union has pushed animal nutritionists to use natural alternatives as growth promoters, such as prebiotics, probiotics, organic acids and herbs (Huyghebaert 2011). Garlic (Allium sativum), one of such natural alternative growth promoters, is used globally as a spice in human food preparation. Garlic belongs to the genus Allium and family *Liliaceae* and is grown in tropical and subtropical countries. The tuber of the *Cyperus esculentus* plant, more often known as tiger nut, is an excellent source of lipids, protein, carbohydrates, fiber, vitamins, minerals and phytochemical constituents. Incorporating garlic and tiger nut into the does' diet may lead to an increase in milk production due to the nutritional benefits provided by these ingredients. Hence, the purpose of this study is to determine the effect of garlic and tiger nut on the milk yield and milk composition of West African Dwarf Goat doe.

MATERIALS AND METHODS

Location of study

The experiment was carried out at the Directorate of University Farm (DUFARMS) Federal University of Agriculture, Abeokuta. The farm lies between latitude 7^0 SSN - 7'8N and longitude 39 11.2 - 3° 2.5E and it is within the rainforest vegetation zone of south Western Nigeria. The mean annual temperature of 23.2°C and relative humidity of 81.5 percent with a seasonal rainfall of 1,112.7mm respectively.

Experimental animals

A total of Fourteen (14) lactating West African Dwarf (WAD) Does in their fourth parity and their live weight ranged from 15kg to 28kg were distributed into seven treatments with two goats per treatment. Seven feed were formulated to contain 0g/kg, 25g/kg, 50g/kg, 75g/kg of tiger nut powder per kilogram (kg) of feed and 25g/kg, 50g/kg, 75g/kg of garlic powder per kilogram (kg) of feed. The animals were fed 0.3-0.5 kg/head/day and given *Panicum maximum ad-libitum* after being chopped. The animals were managed intensively and fed. The does were housed in a cross ventilated pens with slated floors. The doe and kid were tagged for easy identification and data collection.

Preparation of test ingredients

The Garlic were purchased from Lafenwa market in Abeokuta and was included into the experimental diet. The Tiger nut was purchased from lafenwa market in Abeokuta and was sorted to remove foreign materials and dust particles, after sorting the tiger nut undergo more cleaning by the use of clean water, drained and was sprayed on trays to dry, air-drying for a day took place for a day after which oven-drying to a weight of 60^0Celsius commenced, after which was included in the experimental diets of the animal

Table 1: Percentage composition of the experimental diets

Ingredients	Percentage
Maize	10
Wheats	30
Palm kernel cake	28
Rice bran	20
Bone meal	2
Salt	2
Groundnut cake	8
Total	100
Calculated Nutrients	
Metabolic energy	2296.6kcal/kg
Crude protein	17.145%
Crude fibre	9.01%
Ether extract	6.11%

Data collection

Within 24hr after kidding, the dams and kids were weighed to know the parturition weight and birth weight. The kids were allowed to suckle the dams for 7 days postpartum to consume colostrum, establish strong dam-kid relationship (forestall rejection of kids by their dams) and prevent kid mortality as they are non-dairy animals. Hand milking of the animals was adopted. The kids were separated from the dam over-night for 12h overnight (19.00h-07.00h) and re-introduced to their dams after milking. The milk were collected using 500ml graduated plastic beaker measured and weighed thereafter. Values obtained were multiplied by a factor of 2 to get the milk yield for 24hr (Otaru, 2020). These approaches were continued for 12 weeks postpartum after which the kids were weaned and the dam rebred. A portion of the milk (30ml) collected from each dam was taken to the laboratory to determine the composition of the milk using Lactoscan (Latoscan milk analyzer).

Statistical analysis

Data obtained were subjected to a One-way Analysis of Variance (ANOVA), in a Completely Randomized Block Design as contained in SAS (2010). Duncan's multiple range test was used to separate significant different means (SAS 2010) at 5% significance level.

The statistical model used

$Y_{ijk}=\mu + A_i + \sum_{ijk}$

Where,

Y_{ijk} =is observation on milk composition and milk yield.

μ = is the population mean.

A_i = is the effect of diet containing garlic and tiger nut on milk yield, milk composition and

$\sum_{ijk}$ =is the experimental error.

RESULTS

Table 2 shows the effect of garlic and tiger nut on the milk yield and milk composition of West African Dwarf (WAD) does during lactation. Diet had no significant effect on fat, protein, Solid-not-fat, density, lactose, salt, water, temperature, pH and conductivity. However, diet had significant effect on milk yield with T6(50g/kg of garlic) having the highest value and freezing point with T2(25g/kg of TGN) having the highest value.

Table 2: Effect of tiger nut and garlic on milk yield and milk composition of WAD Does

Parameters	0g/kg	25g/kg TN	50g/kg TN	75g/kg TN	25g/kg G	50g/kg G	75g/kg G	Mean	SEM	P value
MK	113.9^{ab}	40.75^{b}	48.13^{b}	42.65^{b}	163.9^{ab}	241.9^{a}	208.8^{a}	122.9	15.5	0.00
Fat	2.59	3.88	2.194	1.74	0.52	0.12	0.52	1.67	0.41	0.138
Protein	3.47	3.72	3.43	3.55	3.57	3.51	3.51	3.54	0.03	0.101
SNF	8.29	8.97	8.23	8.49	8.48	8.29	8.36	8.45	0.07	0.061
Density	20.14	20.97	19.71	20.45	21.12	21.09	20.75	20.61	0.19	0.374
Lactose	4.88	5.23	4.82	4.98	5.00	4.83	4.90	4.95	0.04	0.076
Salt	1.02	1.09	1.01	1.05	1.05	1.04	1.04	1.05	0.01	0.260
Water	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.09	0.09	0.451
Temp	30.46	31.54	0.56	31.81	31.01	30.25	31.69	31.05	0.27	0.610
PH	9.21	9.20	9.03	9.27	9.31	9.14	9.17	9.19	0.06	0.934
Conductivity	4.16	4.37	4.61	3.5	5.00	4.42	4.34	4.35	0.22	0.737
Freezing point	-0.59^{ab}	-0.65^{b}	0.58^{ab}	0.59^{ab}	-0.59^{ab}	-0.57^{a}	0.58^{ab}	-0.59	0.01	0.003

T1= concentrate diet(control), T2 = 25g/kg of tiger nut, T3=50g/kg of tiger nut, T4= 75g/kg of tiger nut, T5= 25g/kg of garlic, T6= 50g/kg of garlic, T7= 75g/kg of garlic, MK= Milk Yield, SNF= solid not fat

DISCUSSION

Investigating the effect of garlic and tiger nut on the milk yield and milk composition of West African Dwarf does yielded insightful results. The results of the project showed an increase in milk yield due to the nutritional benefits provided by garlic and tiger nut.Milk yield was higher in treatment group of goats fed with 50g of garlic per kg of feed. The result of this study is in support of the study of Kholif *et al.*, (2012) who recorded that garlic supplementation in goat feed can increase milk production. The milk composition parameters were not significantly different across the treatment except the freezing point. However, there was a decrease in fat content of the milk as inclusion level increased. This is in tandem with the study of Zakeri and Ehsan (2014), who reported that the dietary addition of raw garlic at a range 30 to 70g/kg of feed can efficiently reduce the concentration of fat in goat milk. The possible reason for this decrease in milk fat is that acetate from the rumen which is used in the synthesis of milk fat is decreased by dietary supplementation of garlic (Kholif *et al*., 2017). The results contribute to a better understanding of how specific dietary interventions can impact milk production and milk quality, ultimately benefiting both the animals and consumers.

CONCLUSION

Diet containing 50g/kg of garlic had the highest peak in milk yield, milk composition and some . It is therefore recommended that diet containing 50g/kg of garlic should be offered to lactating West African Dwarf does to increase the milk yield and some physico-chemical properties of milk.

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