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Effect of *Commelina congesta* Extracts on Milk and Blood Parameters of Dairy Cameroon Dwarf Goats

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Abstract **– This study was aimed to evaluate the effect of Commelina congesta extract administration on gross milk composition, milk component yield and some blood traits in dairy Cameroon dwarf goats. Thirty-six goat were assigned to two groups balanced for daily milk yield; an untreated control group (n=18), that did not receive extract injection, and treated group (n=18) injected with the 90 mg extract at daily intervals for 30 day. Milk yield was recorded daily and four samples of milk and blood per goat were collected at day 1, 7, 14, 21, and 28. Daily component yield, milk composition and blood traits, were analyzed through ANOVA. When compared to untreated control group, goats injected with the plant extract showed higher yield of milk protein (+ 19%, p<0.10), and lactose (+24%, p<0.05). Milk composition and blood parameters in untreated and extract injected goats were not different (p>0.10). Chemical analysis of *Commelina congesta* reveals bioactive compounds like Freidelin, and cyandidin, which stimulate oxytocin and ADH that increases milk ejection and volume. Therefore this plant drug improves milk yield and contents in line with its use as a vegetable to enhance breastfeeding in lactating mothers in the North West region of Cameroon.**

Keywords **– Commelina, Goats, Milk Yield and Composition.**

I. INTRODUCTION

Commelina congesta is a creeping perennial and sometimes annual plant of the Commelinaceae family, regarded in many agro-systems as a weed. Although seldom cultivated, *Commelina congesta* is eaten by humans as a vegetable and as animal fodder often form part of unimproved pastures in the tropics (Humphreys L.R., 1982), and therefore plays a critical role in providing supplementary protein source to grazing and browsing ruminants. (Devendra C., and McLeroy G.B., 1982). As such, they are important assets in small farm systems where, owing to their abundance, they are often harvested for feeding of stall-fed ruminants. (Geesing and Djibo, 2001). This plant forms an important component of grazing ruminants and contributes a major proportion of herbage fed to ruminants in tropical Africa (Lanyasunya., et al 2008). Plants of this family has are used medicinally for the treatment of jaundice, yellow fever, gastro-intestinal pains and venereal diseases. (Burkill . H. M., 1985).

Lactating mothers have traditionally consumed Commelina plant as vegetables during lactation with the believe that it enhanced the volume of the milk available for the suckling baby. This claim has never been investigated and therefore this study is focused on the effects of *Commelina congesta* extracts on dairy goat production, health and economics. We envisage that feeding dairy animals with this herb will result in an improvement of milk and component yield and of productive efficiency.

Therefore a study was carried out at the department of Animal Production Technology of the University of Bamenda to investigate the effect of *Commelina congesta* feedstuff on lactating goats performance. The present study is aimed at evaluating the medium-long term effects of *Commelina congesta* feedstuff on gross milk composition, milk components yield and some blood traits in lactating dairy goats.

II. MATERIALS AND METHODS

A. Phytochemical Analysis

The plant material was collected in Fundong, North West Region of Cameroon in May 2013. The specimen was verified and authenticated by Dr. Tina Fongot of the Botany Department of the University of Buea where a voucher specimen number UB43596 is deposited.

Dried whole plants (21 kg) of *Commelina congesta* were extracted exhaustively with cold 95% EtOH. Evaporation of the EtOH gave a residue, which was then suspended in 15% EtOH (4.5 L) and filtrated. The filtrate was concentrated (5 L) and partitioned sequentially with petroleum ether, EtOAc and *n*-BuOH. The EtOAc-soluble fraction was concentrated and subjected to silica gel column chromatography eluting with $CHCl_3$-MeOH (20:1-2:1) to yield eight fractions. Fraction 1 was purified by repeated chromatography on silica gel (eluted with petroleum

ethereMe_2CO, 8:1-2:1) and Sephadex LH-20 (MeOH as eluent) to afford compounds 1, 3 (44 mg), 5 (28 mg), 7 (14 mg) and 14 (9 mg). Fraction 3 was rechromatographed over a silica gel column to give compound 8 (28 mg). Fraction 2 and fractions 4-8 were further purified similarly by chromatographing on polyamide column (eluted by EtOHeH2O with gradient increased EtOH) and Sephadex LH-20 (MeOH as eluent) to give compounds 6 (3 mg), 12 (125 mg), 11 (19 mg), 13 (10 mg), 9 (49 mg), 10 (40 mg), 4 (10 mg) and 2 (17 mg). The *n*-BuOH-soluble fraction was first applied on polyamide and eluted with EtOH-H_2O (0:1-1:0), giving fractions eluted by water (W) and by EtOH-H_2O (Et). Fraction Et was purified by both silica gel and Sephadex LH-20 column chromatography, yielding compound 15 (9 mg). The structures of the 15 isolates were identified by a combination of spectroscopic methods (MS, 1HNMR and 13CNMR) and comparisons with data in the literature or coTLC with the authentic sample.

B. Animal Experimentation

The trial was carried out on 36 Cameroon dwarf goats (10 primiparous and 26 multiparous) not previously fed with Commelina feedstuff. The goats were housed at the experimental herd station of the School of agronomy of the Natioanl Polytechnique Bamenda in a closed-sided barn in six pens (4 X 7.5 m) with straw litter. The goats were fed *ad libitum* intake, a mixed diet based on hay and commercial concentrate. Goats (36) were allotted into two balanced groups (18) according to daily milk yield from kidding, body weight (48-50 kg) and days in milk: an untreated control group, that did not receive extract administration, and treated group that received daily administration of the extract for 42 days. The plant extracts was administered by subcutaneous injection in the ischiorectal fossa of 90 mg per injection.

C. Sampling Procedure and Statistical Analysis

The goats were milked twice a day (8 a.m. and 8 p.m.) and individual milk yield was recorded daily milk sampling was done at weekly intervals so that 4 samples per goat(0, 7, 14, 21, 28, 35 and 42 days from the extract injection) were available across treatment period. Cold (4^{o}C) a.m. and p.m. composited samples were analyzed for milk fat, proteins and Lactose. (Biggs, 1978)

Blood samples were collected following the aforementioned sampling schedule through jugular bleeding into heparinized tubes evacuated tubes. Plasma levels of glucose, triglycerides, cholesterol, total protein, urea, Ca, P., and Mg was determined automatically (Technicon R. A. 1000 System: Technicon Instruments Corp. Tarrytown, NY) at 36^{o}C.

Repeated measurement of milk composition, milk components and blood traits per goat were analyzed using SAS according to a linear model accounting for the effects of treatment with Commelina extracts (T), disparity (D), as compared with the untreated group.

III. Results and Discussion

A. Chemical Analysis

Based on physico-chemical constants and spectral data, these compounds isolated from *Commelina congesta* extracts were identified as,: one sterol (1), one aliphatic acid (3), four flavones glucosides (2, 9, 10, 13), one flavonol glucoside (15), four phenolic acids (5, 7, 12, 14), two uracil derivatives (6, 8) and two lignans (4, 11).
Biologicallly active compounds identified were β-coumaric acid, Freidelin, kaempherol rutinoside, β-sitosterol, cyandidin, and ferulic acid

B. Effects of the Plant Extracts on the animal

Lactating goats treated with the extracts of *Commelina congesta* showed an increase of daily yield in comparison with untreated goats.

Table I: Least Square means of milk production and blood traits in untreated and treated goats.

	Group		Disparity (D)
	Untreated	Treated (T)	
Milk Content of			
Fat (%)	2.46	2.53	0.07
Protein (%)	2.64	2.66	0.02
Lactose (%)	4.76	4.79	0.03
Daily Yield of			
Fat (g/d)	55	67	12.00
Protein (g/d)	58	69	11.00
Lactose (g/d)	106	125	19.00
Plasma Metabolites			
Glucose (mmol/l)	2.91	3.07	0.16
Triglycerides(mmol/l)	0.25	0.23	-0.02
Cholesterol mmol/l	2.62	2.62	00.00
TotalProteins (g/l)	77.45	77.58	0.33
Urea (mmol/l)	10.89	10.53	-0.36
Plasma Minerals			
Calcium (mmol/l)	2.35	2.39	0.04
Phosphorus (mmol/l)	2.03	1.89	-0.14
Magnesium (mmol/l)	1.05	0.99	-0.06
Total Milk Yield (l/d)	0.75	0.93	0.18

Milk fat, protein and lactose content during the treatment period was similar in *Commelina congesta* extract injected and untreated goats while there was significant increase ($p< 0.05$) of these nutrients induced by the plant extract treatment (+ 42 g/d over the milk yield of the control goats. Treated goats yielded 19% more milk fat, protein and lactose than untreated goats. The administration of *Commelina congesta* extract did not change the plasma level of several blood traits related to energy and nitrogen metabolism status. Likewise, the concentration of calcium, phosphorus and Magnesium was nearly identical in plasma from treated and untreated goats.

Throughout the trials, the treated goats exhibited a 24% significantly higher ($p < 0.05$) daily milk yield in comparison to non-treated ones (0.93 and 0.75 l/d, respectively). The plant extracts is rich in protein content (Salah, 2001) with a high concentration of amino acids especially methionine and lysine with a positive effect on protein utilization for milk secretion (Sevi et al. 1997). Increase milk fat yield ($p<0.05$) was also observed in treated goats due to improved transport of lipids to the mammary gland (Piva, 1990).

Commelina congesta is used in the North West Region of Cameroon to induce child birth and it is believed to increase the contractile frequency and generate more tension by smooth muscles. (Perez et al., 1996). Some of the compounds such as freidelin, and cyanidin (Mowrey 2006) stimulate the release of posterior pituitary hormones antidiuretic hormone (ADH) oxytocin (Duke, 1992). Oxytocin stimulate milk ejection assisting the milking of animals and ADH increases water body contents (Seidle 2002), thus increasing the volume of milk produced. Sitosterol antagonizes dopamine (Mowrey 2006) which is a prolactin inhibitor. Prolactin is the major hormone responsible for milk production, (Seidle 2002). With the inhibition of the effect of dopamine, prolactin secretion increases resulting in increase milk production. Extracts of Commelina have active antibacterial agents (Lin-Y-C et al., 1973), and therefore are essential for the protective effect on the milk against bacterial contamination.

IV. Conclusion

Chemical constituents from *Commelina congesta* determined a significant increase in milk yield, milk protein and fat yield and milk protein content as well as the milking facilitation and antibacterial effect. This indicate that the effects of this plant extract in dairy goats is effective in improving milk yield, and protein contents. This is in line with the recommendation for consumption of the vegetable by lactating mother in the North West Region of Cameroon.

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