ASSESSMENT OF REPRODUCTIVE PERFORMANCE OF YANKASA SHEEP USING ETHANOLIC EXTRACT OF STEMBARK *OF Crossopteryx febrifuga* AS SYNCHRONIZING AGENT

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ABSTRACT

This study was conducted to determine the reproductive performance of *Yankasa* Sheep using ethanolic extract of *Crossopteryx febrifuga* (stembark) as synchronizing agent. A total of twenty five *Yankasa* Ewes were used in the study. The ewes were randomly allocated to five treatment groups and replicated five times. One buck was assigned to each treatment group in a completely randomized design (CRD).The photochemistry revealed Alkaloids (4.13%), Flavonoids (1.96%), Saponins (1.05%), Tannins (2.11%), **Steroids (6.54%)** and Phenols (2.34%), while Glycosides and Terpenoids were not detected. The control group was not administered with the extract, while the remaining treatment groups T1, T2, T3, T4, T5 were administered with 5% *Crossopteryx febrifuga* extract through intravenous, oral, subcutaneous and intramuscular routes. Of the 20 ewes, three (3) exhibited heat within 24-48, 6 in 48-72 hours, 4 between 72-96 hours and 2 expressed heat within 96 -120 hours after *Crossopteryx febrifuga* (Stembark) extract administration. The estrus response rate and conception results were 100, 60, 40 and 100% and 60, 60, 20 and 80% for intravenous, oral, subcutaneous and intramuscular routes, respectively. Significant positive correlations were found between estrus and concentration ($P < 0.01$), calculated doses and concentration ($P < 0.01$), calculated doses and estrus ($P<0.01$), body condition score and estrus ($P<0.01$). It could therefore be concluded that good response rate exhibited by the sheep may be due to the presence of steroid properties which has synchronizing ability capable of inducing heat and regulate the female reproductive cycle. Intravenous and intramuscular routes of administration are recommended for ethanolic extract of *Crossopteryx febrifuga* (stem bark) for Yankasa sheep.

Keywords: Glycosides Crossopteryx febrifuga, Steroids, ethanolic extract

INTRODUCTION

Synchronization of estrus implies the manipulation estrous cycle or induction of estrus to bring large percentage of a group of females into estrus at a short, predetermined time (Odde, 1990). It focuses on the manipulation of either the luteal or the follicular phase of the estrous cycle. In does and ewes, the opportunity for control is greater during the luteal phase, which is of longer duration and more responsive to manipulation (Denwick, 2002). Strategies can be employed to extend the luteal phase by supplying exogenous progesterone or to shorten this phase by prematurely regressing existing corpora lutea (CL) (Wildeus, 2000). Synchronization of estrus programs provide several advantages e.g. permits parturition to occur at suitable times in order to take advantage of feed and labor, availabilities, markets, and increasing price trends (Safdarian *et al.*, 2006). Furthermore it also enable better estrus detection, shortening of Lambing intervals, concentration of lamib crop, improved management of pregnant ewes, induction of puberty in doe and the more efficient use of labor and animal facilities (Rahman *et al*., 2008; Abecia *et al*., 2012).It also facilitates reproductive management and AI in dairy

MATERIALS AND METHODS

The Study Area

The experiment was conducted in Bilyaminu Usman Polytechnic Farm Hadejia, located in Hadejia Local Government Area of Jigawa State. It is located on latitude 12.45^0N and longitude 10.04^oE. It covers an area of 349 meters square.

Experimental Animals, Plant Collection and Identification

Thirty sexually matured Yankasa sheep ewes used for the experiment (25 ewes and 5 bucks).The animals aged one year for ewes and one and half years for rams, were obtained from reputable sources within Jigawa state. The animals were allowed to acclimatize for two weeks prior to the commencement of the study and during this period they were vaccinated against pest de petit ruminant (PPR). Multivitamins, Antibiotics and Ivermectin injection were administered. Adequate feed and water were given adlibitum. The animals were managed intensively throughout the study. The ages of the animals were determined through dentition (Geoff,

2016).*Crossopteryx febrifuga* was collected within the University Community and identified at the Department of Forestry and Wildlife of the University of Technology Modibbo Adama, Yola

STATISTICAL ANALYSIS

RESULTS AND DISCUSSION

Phytochemistry of *Crossopteryx febrifuga*

The Phytochemical screening of ethanolic extract of ***Crossopteryx febrifuga*** (stem bark) revealed the Presence of Alkaloids (4.13%), Flavonoids (1.96%), Saponins (1.05%), Tannins (2.11%), Steroids (6.54%), and Phenols (2.34%), while Glycosides and Terpenoids were not determined as presented in (Table 1).

Table 1: Phytochemical Composition of stemback *Crossopteryx febrifuga*

Phytochemicals	Qualitative	Quantitative (%)
Alkaloids	+	4.13
Flavonoids	+	1.96
Saponins	+	1.05
Tannins	+	2.11
Steroids	**++**	**6.54**
Phenols	+	2.34
Glycosides	ND	-
Terpenoids	ND	-

++ = High concentration, + = Moderate concentration. ND = Not detected

Table 2: Concentration, Route of administration, Onset of Estrus and Conception Rate of Yankasa Sheep.

Trt	Conc.	Age	R/A	Response Time of estrus (hours)				Number of Ewes/Response rate (%)	
(%)	(yrs.)	0-24		24-48	48-72	72-96	96-120	Estrus rate	Conception rate
T1	0%	1-1.5	CRL	0	0	0	0	0/5(0)	0/5 (0)
T2	5%	1-1.5	IV	0	12	2	0	5/5(100)	4/5 (80)
T3	5%	1-1.5	OR	0	0	2	1	3/5(60)	3/5 (60)
T4	5%	1-1.5	SC	0	0	0	0	2/5 (40)	1/5 (20)
T5	5%	1-1.5	IM	0	2	2	1	5/5(100)	4/5(80)

Key = RA= Routes of administration of the extract. Trt =Treatment

= CRL- Control, IV – Intravenous, OR – oral, SC – subcutaneous, IM – Intramuscular

Table 3: Correlation of Different Reproductive Parameters in Yankasa Sheep

Variable	Con.	Estrus	Weight	Age	Calc. d.	BCS
Conc	1.00					
Estrus	0.75**	1.00				
Weight	0.07^{ns}	-0.07^{ns}	1.00			
Age	1.00	1.00	1.00	1.00	1.00	
Calc. d.	0.81**	0.72**	0.09^{ns}	1.00	1.00	
BCS	0.14^{ns}	0.70**	-0.02^{ns}	1.00	0.16^{ns}	1.00

Key: Con: Concentration; Calc.d; Calculated doses; BSC: Body Condition Score.

Correlation between reproductive parameters

Significant positive correlations exist between estrus and concentration ($P < 0.01$), calculated doses and concentration ($P < 0.01$), calculated doses and estrus ($P<0.01$), body condition score and estrus ($P<0.01$) as presented in Table 4.

DISCUSSION

The results ofphytochemical screening obtained in this study was in agreement with (Adebayo *et al.,* 2017; Oyeleke *et al*., 2008). The result was also similar with the report of (Eluka *et al.,* 2015*;* Soloufou *et al*., 2018). The forgoing results point to the fact that solvent play a crucial role in phytochemical analyses. Poor to zero yields of extracts have been reported due to solvent effect elsewhere.

The presence of important phytochemicals, such as: alkaloids, flavonoids and phenols in the stem bark and leaves of *Crossopteryx febrifuga* plant is pertinent as these groups of secondary metabolites are medically beneficial and other phenolic compounds are potent water-soluble antioxidants and free radical scavengers that prevent oxidative cell damage and have strong anti-cancer properties (Okwu, 2004).

The presence of steroids in this study reveals the activity of the plant in stimulating estrus in animals. The relationship between chemical composition of plants and geographical location has been documented. Adeshina *et al*. (2010) reported that the geographical location of the plant influences the amount of phytochemicals present in it;

CONCLUSION AND RECOMMENDATION

Onset of estrus

The response time of estrus or onset of estrus in this present study disagreed with Lemaster*et al.* (2001) who reported 48-72hrs after $PGF_{2\alpha}$ injection. Kebede*et al.* (2013) reported 60-72hrs following administration of $PGF_{2\alpha}$. Bobbo and Gladys (2019) reported 48-96hrs following *Ficus sur* administration in cattle. Variation in the onset of estrus exhibited by the animals may be due to the stage of follicular development at the time the stem bark extract was administered which affected the interval from administration to standing estrus or the variation was created by differences among ewes in the rate of regression of the corpus luteum following treatment. The duration and the pattern of estrus expression in this study is in consonance with Bobbo and Dauda, (2021) following administration of f*icus sur* leaves in Yankasa Sheep

Estrus response rate

The estrus response rate obtained in intravenous and intramuscular routes of administration in the present studyis higher than the 47% (Robinson and Moore, 1967), 90% reported by (Tumen, *et al.,* 1992), 77% reported by (Mansour *et al.*,1993), 80.9% reported by (Abdullah *et al.*,2002), 85% reported by (Lethy *et al.*,2003), 84% reported by (Abdel-Mageed,2006), 62.5% (Patil and Pawshe 2011), 80% or greater (Hussein *et al.,* 1998), but inconsonance with 100% reported in Karakul ewes (Hashemi *et al.,* 2006), 100% reported in Akkaraman Crossbred ewes (Akoz *et al.,* 2006). The estrus response rate also compares favorably with the findings of the Previous studies by Nasroallah *et al*. (2012) who reported 93.3% when used $PGF_{2\alpha}$- FGA- eCG protocol, 71.4% when used $PGF_{2\alpha}$- FGA- GnRH protocol. 96%,by (Koyuncu and Alticekic 2010). The combination of GnRH + $PGF_{2\alpha}$ and $PGF_{2\alpha}$ + $PGF_{2\alpha}$ injections had 93.7% and 86.6% estrous rate in sheep during breeding season (Ataman and Akoz, 2006), 88% by Bowdridge *et al.* (2013) in Boer goat. Nur *et al.* (2013) found that Progesterone had 92% and 84% estrus rate

The conception rate

The conception rate in intramuscular and intravenous routes of administration in this study were slightly higher than 72% reported by(Hussein *et al*. 2003), 72% by (Abdel-Mageed 2006), 76.4% (Tumen *et al.,* 1992), 60% and 78% (Riaz *et al.,* 2012) and 53% Bowdridge *et al.,* (2013) in Boer and Crossbred -Boer goats during breeding season. On the contrary the result disagreed with(Akoz *et al*. 2006, Huseyin and Yildiz, 2005, Gulyuz and Kozat 1995) who obtained 100%, 100% and 96% pregnancy rate respectively. The findings of this study is slightly lower than 85.7% and 84.6% pregnancy rate in sheep during breeding season (Ataman and Akoz, 2006). The discrepancy in the results reported by different researchers on pregnancy and estrus response rate could be explained by the differences in body condition, breed, genotype, housing, management system and stage of follicular development. It has been observed that flushing animals with high energy feed following administration of synchronizing drugs results in very high response rate (Cruz *et al.,* 1991).

The strong positive correlation between body condition score and estrus in this study is in agreement with (Kleeman and Walker 2006) on Merino Ewes. Similarly significant strong correlation obtained in this work is inconsonance with (Johnson *et al.,* 1974).Furthermore the significant strong positive correlation between estrus and concentration in this study agreed with (Lemon *et al.,* 1975). The non -significant negative correlation (r = -0.07) between weight and estrus in this study disagreed with Francisco *et al.,* (2020)who reported no correlation. Also non-significant negative correlation obtained in this study disagreed with Nsoso *et al.,* (2003) reported no correlation between weight and body condition score.

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