

IMPACT OF ACTIVE IMMUNIZATION AGAINST INHIBIN, USING A SINGLE BOOSTER DOSE, ON OVULATION RATE AND FERTILITY IN LOW-PROLIFIC SIROHI GOATS

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ABSTRACT

Five Sirohi does received primary immunization against endogenous inhibin (400 µg peptide-ovalbumin conjugate, S.C.) and five others were kept as control (400 µg ovalbumin, S.C.). All the does received a single booster (Immunized, 200 µg peptide-ovalbumin conjugate; control, 200 µg ovalbumin) about four weeks after primary immunization. Estrus was synchronized using a double injection schedule of PGF_{2α} on days 35 and 45 from the day of primary immunization. Immunization against inhibin lead to an increase in ovulation rate and corpora lutea as indicated by plasma progesterone. The kidding percentage in immunized and control group was 100% (litter size, 1.63) and 80% (litter size, 1.25), respectively. Thus, inhibin immunization with a single booster dose can be used to improve ovarian activity and fertility in low-prolific Sirohi goats.

Keywords: Fertility, Goat, Immuno-neutralization, Inhibin, Ovulation rate

Sirohi goat, for both meat and milk purpose, is a well-recognized breed from Sirohi district in Rajasthan and is well acclimatized in northwestern-arid and semi-arid agro ecological regions that include Rajasthan, Punjab, Haryana, Uttar Pradesh, Gujrat and Madhya Pradesh. This goat breed has better performance for average daily gain but is less prolific due to less twinning probability compared to other goat breeds.

To increase litter size in ewes and does, various inhibin-based preparations or vaccinations were used which neutralized endogenous inhibin, lead to an increase in circulating FSH and thus ovulation rate (Dietrich *et al.*, 1995). In a previous study, inhibin immunization protocols involved the use of three booster doses following the primary immunization at monthly interval (Medan *et al.*, 2003). The aim of present study was to increase the prolificacy in low-prolific Sirohi does immunized with one booster dose of inhibin-based peptide immunogens.

The present study was conducted on adult cyclic

Sirohi does (n=10) maintained under standard farm practices in a semi-arid zone at 27°N latitude and 78°NE longitude at 176 meters above the sea level. Under the immunization protocol, synthetic peptide mimicking α-subunit of porcine inhibin (Sigma-Genosys, England) was conjugated with ovalbumin, maintaining molar ratio of peptide to ovalbumin at 20:1. In treatment group, primary immunization was done by sub-cutaneous injection (400 µg peptide-ovalbumin conjugate dissolved in 1 ml isotonic saline and emulsified with an equal volume of Freud's complete adjuvant) at two different sites. In control group, 400 µg ovalbumin was used and rest of the procedure was similar to their treatment counterparts. The booster dose was administered four weeks after primary immunization and each treatment group animal was administered 200 µg peptide-ovalbumin conjugate (control group, 200 µg ovalbumin) dissolved in 1 ml isotonic saline and emulsified with Freud's incomplete adjuvant.

Estrus synchronization involved the use of double injection schedule of PGF_{2α} (Cloprostenol 263 µg/

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ml) on day 35 and day 45 subsequent to the day of primary immunization. After the inhibin immunization, blood samples were collected twice a week to observe the ovarian activity (plasma progesterone based) in relation to increased ovulation and corresponding increase in corpora lutea. Following estrus detection using teaser buck of high sexual vigour, the does were mated with breeding bucks to ascertain their fertility and prolificacy.

In the present study, the kidding percentage in inhibin-immunized and control group was 100% and 80%, respectively including two twins kidding in the immunized group, thus, the litter size increased from 1.25 to 1.63. Others have also exhibited that inhibin-based fecundity vaccines have potential of increasing ovulation rate in indigenous sheep breeds. Active immunization against inhibin in Malpura ewes increased the ovulation rate by five-fold compared to controls (Naqvi *et al.*, 2007). The effect of immunization persisted for about 36 months and was expressed in term of increased ovulation rate.

In the present study, plasma progesterone was high ($p < 0.05$) in the actively immunized does compared to control group at the start of estrus synchronization (Immunized, 9.58 ± 5.51 ; Control, 3.25 ± 1.5 ng/ml), on day 8 after start of synchronization (Immunized, 8.58 ± 5.35 ; Control, 1.75 ± 0.75 ng/ml) and on day 16 after the end of estrus synchronization protocol (Immunized, 8.66 ± 7.29 ; Control, 4.37 ± 3.12 ng/ml). The higher plasma progesterone in does immunized against inhibin suggested higher ovulatory ovarian activity. Similar previous studies have reported two-

three fold increases in ovulation rate in goats as well as in sheep (Dietrich *et al.*, 1995; Naqvi *et al.*, 2009). All these studies employed three-booster regimens to improve the number of embryos produced per animal. However, the present study exhibited an increase in ovarian activity and improved fertility by single booster injection. Thus, it can be concluded that inhibin immunization with a single booster dose can be used to improve ovarian activity and fertility in Sirohi goats.

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