

EFFECTS OF INHIBIN- α AND ANTI-INHIBIN- α IMMUNIZATION ON THE REPRODUCTIVE HORMONES IN KAZAKH SHEEP

Bakhet, B.^{1,2}, S. Lina^{1,2}, T. Kanat³, K. Rizabek³, Y. Gulmira⁴, S. Bibigul³, **H. Yang^{*1}**, Q. Jiang⁵, J. Xie² and H. Oralhazi^{*2}

State Key Laboratory of Sheep Genetic Improvement and Healthy Production, Xinjiang Academy of Agricultural and Reclamation Science, 832000, Shihezi, Xinjiang, China.

²College of Animal Science and Technology, Shihezi University, 832000, Shihezi, Xinjiang, China.

³Faculty of Bioresources and Technology, Kazakh National Agrarian Research University, 050010, Republic of Kazakhstan.

⁴South Kazakhstan Pedagogical University, 160012, Republic of Kazakhstan.

⁵Animal Husbandry Workstation of Ningxia Hui Autonomous Region, 750021, Yinchuan, Ningxia, China.

*Corresponding author's email: 1508217366@qq.com, yhxjcn@sina.com

ABSTRACT

The Kazakh sheep is native to China. The breed has many advantages, including its size, hardiness, and good meat production, it has the economic disadvantage of having a low reproductive rate. Inhibin- α (INH α) regulates the synthesis and secretion of follicle-stimulating hormone (FSH) and could feasibly be used to boost reproduction in the Kazakh sheep. However, the current methods of INH α preparation are both costly and time-consuming. Here, we investigated the effects of INH α on Kazakh sheep reproductive performance by immunization with INH α and analyzing the subsequent changes in reproductive hormone levels and blood biochemical indices. An anti-INH α polyclonal antibody was raised in camel. It and a recombinant INH α protein were used to immunize groups of adult Kazakh sheep in anestrus. Reproductive hormones (FSH, luteinizing hormone [LH], progesterone [P₄], and estradiol [E₂]) were measured by ELISA, together with the measurement of changes in INH levels and blood physiological and biochemical indicators. The blood levels of LH and P₄ in the sheep immunized with the camel anti-INH α polyclonal antibody (group A) did not differ significantly from those in the recombinant INH α protein (group B) and the control group (group C) ($P > 0.05$). FSH and E₂ levels in group A were significantly higher than the controls ($P < 0.05$) and the INH concentrations were significantly lower than those in group C ($P < 0.05$). There were no abnormalities in the blood biochemical indices in groups A, B, and C. In conclusion, immune INH α preparations significantly affected the blood reproductive hormone levels of Kazakh sheep. This technique has potential application for improving the reproductive performance in these sheep and is also relevant for future research into the development of an INH α vaccine.

Key words: Inhibin α , Immune, Kazakh sheep, Polyclonal antibody, Reproductive hormones

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INTRODUCTION

Sheep, one of the most common livestock ruminants, are raised all over the world, providing a variety of meat, fat, milk, skin, and wool products (Pierson and Ginther, 1988). China's sheep stock and meat production rank first in the world but still require additional mutton imports to meet the market demand. The main reason for this phenomenon is the low lambing rate and poor reproductive performance of China's sheep. In addition, most sheep are seasonal estrous animals and only breed in the autumn and winter. Seasonal estrus also contributes to the long lambing interval and low reproductive rate (Ortavant *et al.*, 1985). The improvement of reproductive performance is, therefore, a concern in sheep breeding. Kazakh sheep are one of the local breeds in China, farmed mainly in Xinjiang. The sheep are concentrated in the Hami region and the edge

of Junggar basin and are also distributed in the border regions of Xinjiang, Gansu, and Qinghai. Kazakh sheep generally reach sexual maturity at the age of 4-6 months. They have the unique advantages of large size, strong physique, resistance to poor conditions and low temperatures, fast fattening resulting in more meat production, tender meat, and light smell. The Kazakh sheep is a typical seasonal estrus sheep. Estrus usually occurs in the autumn, with the remainder of the year termed anestrus (Ortavant *et al.*, 1985). The complete estrous cycle lasts about 18 days (Zhai, *et al.*, 2018), and the average estrous interval is 16.5-17.5 days (Di *et al.*, 2014). The gestational period is about 150 days, and the lambing rate is 102% (Wang *et al.*, 2015).

Inhibin (INH) is a glycoprotein hormone derived from the Sertoli cells in the testis and the granulosa cells of the ovary. It belongs to the member of transforming growth factor beta (TGFP) superfamily (Meldi *et al.*, 2012). The protein is a hetero-dimer composed of α and β