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Thesis Advisors: Assoc. Prof. Dr. Chainarong Navanukraw,
Assoc. Prof. Dr. Chalong Wachirapakorn,
Assist. Prof. Dr. Parwadee Pakdee

ABSTRACT

The aims of the dissertation were; 1) to study the growth pattern of post-weaning and pubertal periods, 2) to apply the basic assisted reproductive technology (ART) apply induction and manipulation of ovarian function to increase efficacy reproductive management in Thai-native goat and 3) to study the compensatory growth application using stair-step feeding regimen on fertility improvement and reproductive management. Three experiments were conducted in Thai-native goats to meet the objectives of the dissertation as follows:

Experiment 1 Twelve female Thai-native goats, 3 months of age were used to study the pattern of growth during two phases: Phase I: post-weaning (3-6 months of age) and phase II: pubertal period (7-12 months of age). The average initial body weight was 8.33 ± 0.17 kg. The animals were fed roughage for ad libitum and concentrate at 1.5% of body weight. The average final weight (6 months of age) was 12.36 ± 0.26 kg. Average daily gain was 46.16 ± 1.80 g/d, whereas total feed intake was 353.21 ± 6.53 g/d and feed conversion ratio was 7.75 ± 0.21 . In pubertal period, twelve female pubertal Thai-native goats, 7-12 months of age with the initial body weight of 12.78 ± 0.20 kg were observed. The goats were fed roughage and concentrate at 1.5% of body weight. In this period, a vasectomized male goat was introduced twice daily as female goats detector. The female goats were assigned into three groups: Group I (exhibited the first estrus within 60 days when goat was used as initial trial, n=8), Group II (delay of exhibited after 60 days, n=2) and Group III (anestrous cycle when goat was classified, n=2). The result showed that the average daily gain in group I

were greater ($P < 0.05$) than the group II and III (41.52 ± 1.56 vs 24.16 ± 1.94 and 20.83 ± 0.27 g/head/d, respectively). Moreover, the total feed intake in group I were greater ($P < 0.05$) than the group II and III (585.90 ± 7.27 vs 484.62 ± 7.12 and 449.12 ± 4.37 g/head/d, respectively). There were ten female goats (83.3%) exhibited estrous cycle but 2 of them (16.7%) were anestrus cycle until to finished trial. Eight female goats (80%) had normal estrous cycle (group I) with the average estrous cycle of 20.75 ± 0.45 days and 2 goats (20%) had a delay of estrous cycle (group II) with the average estrous cycle of 15.17 ± 1.50 days ($P < 0.01$). The age at the first estrus of groups I was less than the group II (228.12 ± 8.95 vs. 326.25 ± 24.56 days; $P < 0.05$). The body weight at the first estrus in group I was greater ($P < 0.05$) than the group II (16.63 ± 0.64 vs 13.25 ± 0.25 kg; $P < 0.05$). The results indicated that body weight of goat affected on the time to the onset of the estrus and behavior.

Experiment 2 Thai-native non pregnant goats ($n=16$; 14 months of age and average body weight = 21 ± 0.60 kg) received of two treatments of induction of follicular growth and superovulation: 2 days FSH (FSH-P; Folltropin-v[®]; 2D-FSH) and 3 days FSH (3D-FSH). Group of 2D-FSH was intramuscularly injected with twice daily FSH for 2 days (18 mg), starting on day 18 and 19 with 300 IU hCG (Chorulon[®]) on day 20 of estrous cycle. Group of 3D-FSH was injected with twice daily FSH for 3 days (24 mg), starting on day 17, 18, 19 and with hCG on day 20 of estrous cycle. Goats underwent laparotomy at 24 h after injected hCG to count corpora hemorrhagica (CH) and at 72 h to count corpora lutea (CL). Blood samples were taken to determine plasma progesterone (P4) concentrations on day 17, 18, 20, 21 (laparotomy at 24 h) and day 23 (laparotomy at 72 h). The results found that numbers of follicles in follicular size 1-3, 4-6 and ≥ 7 mm at 24 h were not statistical difference between 2D-FSH and 3D-FSH groups ($P > 0.05$). However, the number of follicles in follicular size 4-6 mm of 2D-FSH group was greater ($P < 0.01$) than 3D-FSH group (1.75 ± 0.47 vs 0.25 ± 0.25) but less ($P < 0.01$) than the 3D-FSH group in follicular size ≥ 7 mm. The ovulation rates at 24 h of 3D-FSH were as 67% greater than 2D-FSH as 40% ($P < 0.01$). Plasma P4 concentrations were high on day 17 and 18 then decreased on day 20, 21 and day 23. However, treatments were not significant difference ($P > 0.05$). These results showed that superovulation with decreasing dose FSH (3D-FSH) and 300 IU hCG can effective protocol in goats for

multiple follicular development and ovulation use as for achieving successful development of reproductive technologies in Thai-native goat.

Experiment 3 Sixteen Thai-native non pregnant goats were used with the average age of 8 months and body weight of 17.00 ± 0.60 kg, respectively. The does exhibited at least 2 normal estrous cycles and were housed in 1 m^2 steel cages. Heat detection was twice daily recorded using a vasectomized buck. The female goats were randomly assigned into two groups: Control and Stair-step feeding group. In the control group, goats were fed 100% of nutrients requirement for growth in puberty periods. The control animals consumed Ruzi grass hay, DM = 500 g/head/d and concentrate supplemented at 1% of body weight. Total feed intake was 670 g/head/d, (ME = 1.48 Mcal/head/d, TP = 55 g/head/d during day 1-42). In the stair-step feeding group, treatment divided in two phases: feed restriction and realimentation. In the first phase, goats were fed roughage and concentrate at 70% of the average consumption of control group during day 1-21 (1st estrous cycle). In the second phase, goats were offered 130% of the average consumption of control group during day 22-42 (2nd estrous cycle). Goats were scheduled to determine follicular growth and number, as well as oocyte quality by surgical laparotomy procedures. The results showed that average total feed intake, average daily gain and feed conversion ratio were not significant difference between stair-step and control group ($P > 0.05$). Serum glucose concentrations at 4 h during realiment phase were greater than that of control group ($P < 0.05$). Numbers of total follicles in stair-step group were greater than that of control group ($P < 0.05$). Moreover, oocyte quality of the treatment group was better ($P < 0.01$) than that of control group in follicular size of 1-3 and 4-6 mm. The granulosa and theca cell labeling index were determined morphometrically. The rate of cell proliferation in the granulosa and theca layers of follicular size (1-3, 4-6 and ≥ 7 mm) were greater than that of control group ($P < 0.05$). In addition, the mRNA levels of Bcl-2 gene express (by the real time RT-PCR technique) in the granulosa and theca layers tissue of follicular size 1-6 mm in the stair-step feeding group were greater than the control group ($P < 0.01$ and $P < 0.05$, respectively). These results revealed that stair-step feeding regimen affects fertility improvement in Thai-native goat.