EFFECT OF REPLACEMENT OF CLOVER HAY BY DIFFERENT LEVELS OF PANICUM MAXIMUM ON REPRODUCTIVE PERFORMANCE OF V-LINE RABBIT DOES

Walaa A. Salama*, Amira. M. Refaie, A. E. Shams El-deen, M. M. Beshara, F. S. Khalil and A. M. Alazab

Animal Production Research Institute, ARC, Dokki, Giza-12618, Egypt.

*Corresponding author: dr. walaa.attia@gmail.com

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SUMMARY

Twenty V-line rabbit does aged 5 months, weighing about 2.925.6 ± 6.69 kg were used in the present experiment to evaluate the effect of different levels of Panicum maximum 15, 30 and 45% replacement of clover hay on reproductive performance of rabbit does. Rabbit does were randomly distributed into 4 groups. Group (1) fed control diet, group (2), group (3) and group (4) were fed 15%, 30 and 45% Panicum maximum respectively, replacement of clover hay. Results could be summarized as follows:

1- Change in weight of the does were significantly decreased with 15% and 30% Panicum maximum feeding diets during gestation period compared with control, while change in weight at pregnant insignificantly differed to control when replacing 45% Panicum maximum to clover hay.

2- Feed intake was significantly increased with replacing different levels of Panicum maximum at pregnant period and replacing 30 and 45% panicum at lactating does.

3- Litter weight and litter weight gain of kids with rabbits fed diets containing 45% panicum maximum at week 1 until week 4 were close to data of litter weight with rabbit fed control. Mortality rate was not significantly different between different treatments.

4- Inclusion of 45% Panicum maximum significantly recorded the highest milk yield during the four weeks of lactation compared with others groups, litter weight and litter weight gain and the highest economical efficiency. Conclusively, it is possibility to replace 45 % of clover hay by Panicum maximum of the rabbit does diets.

Keywords: Panicum maximum, clover hay, rabbit does and diets.

INTRODUCTION

Panicum maximum (guinea grass) is naturally grown in Africa. Also, it is indigenous to the subtropical areas of southern Africa where it occurs mainly in the sub habitat under trees (Pieterse et al., 1997).

The quality of available bites is depressed when green leaf material is scarce and largely dispersed among senescent material especially in the case of older pasture for which the NDF and ADL fractions increased with level of maturity .The nitrogen content (CP) of pasture also decreased from the young to mature stages. Variation in the proximate composition of Panicum maximum var trichoglume . Eyles based on stage of growth and location of pasture (FAO, 2003). It dies if continually grazed close to the ground and needs rest late in the growing season. (FAO, 2003). Reling et al. (2001) concluded that increased pasture maturity had a negative effect on the nutritional value of P. maximum. Aganga and Tshwenyane (2004) showed that in vitro digestibility for sheep of Panicum maximum decreased with
level of maturity an all seasons except winter in agreement with reports that a decrease in N content and an increase in NDF, ADF and ADL content are associated with a decrease in digestibility (Cilliers and Van der Merwe, 1993). Miegoue et al. (2018) found that Panicum maximum contained DM; 91.76, OM; 85.88, CP; 13.45, CF; 33.08, EE; 2.67 and ash 14.12%, respectively. Ezea et al. (2014) found that better weight gain of pregnant rabbits and better weight litters compared to control group when pregnant rabbit fed concentrate plus mix of forage (containing Panicum maximum). Udeh et al. (2007) found that rabbits the highest feed intake with rabbits fed Panicum maximum compared with other forage as Centrosema pubescens and Sida acuta. Guinea grass is used as forage for beef production. It is used as a cultivated grass both for pasture and hay (Aganga and Tshwenyane, 2004). Guinea grass (Panicum maximum Jacq.) has been used for more intensive cattle production systems Fernandes et al. (2014).

Hence, the aim of the study is to investigate the effect of partial replacement of clover hay by Panicum maximum on reproductive performance, and economical efficiency of rabbit does.

MATERIALS AND METHODS

This study was carried out at, Elsero, Station Demeta Governorate, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt. Panicum was obtained from Alexandria desert road, Egypt farm, it was dry in sun until complete drying and ground by hammer mill and kept for chemical analysis before mixing into the experimental diets.

The experimental design:

Four experimental diets were formulated; the first used as control diet without panicum while the other three diets were incorporated by Panicum maximum at 3.00, 6.00 or 9.00 % levels in the diet replacing (15, 30 or 45% of clover hay) of rabbit does diets as shown in Table (1). A total number of 20 V-line rabbit does age 5 months, weighing about 2.925.6 ± 6.69 kg were randomly distributed individually into 4 experimental treatments (5 does/ treatment). Mating was achieved by 4 adult V-line bucks aged 6 months with 3.0 kg average body weight, with good fertility records. Bucks were fed on control diet. Does were naturally inseminated. Detection of conception was carried out by palpation at 10 days after mating and the non pregnant were remitted immediately. Does were housed in individual wired-cages. All animals were kept under the same management and hygienic conditions and provided with fresh water and pelleted diets, ad-libitum over the experimental period.

Experimental diets and measurements:

All experimental diets were formulated to be iso-nitrogenous and iso-caloric, and to meet all the essential nutrient requirements of rabbit does according to (Agriculture Ministry Decree, 1996). The chemical analysis of the experimental samples of diets, Panicum maximum and clover hay were done according to the conventional methods of AOAC (2000). Chemical analyses of Panicum maximum and clover hay are presented in Table (2). The digestible energy (DE kcal /kg) of Panicum maximum determine in the 1st experiment, six male V-line rabbits at 14 weeks of age were feeding each rabbit with 240 g (120 g clover hay + 120 g Panicum maximum) for seven days during which the feces were collected daily sprayed with 2% boric acid solution for trapping any ammonia released from feces. At the end of this period, where, feed intake was calculated and feces were dried at 60o C for 48 hours (till constant weight), finely ground and thoroughly mixed to ensure sample uniformity and then stored until being analyses according to the official methods (AOAC, 2000) for gross energy determination. Does weight, feed intake, litter size and weight at birth and weekly up to weaning were recorded. The change in live body weight during gestation period was calculated as the difference between the live body weight at weekly after kindling using the weight-suckle-weight technique described by McNitt and Lukefahr (1990). In this method, the kids of each doe were separated from their dams by closing the gates between the nest box, at night. In the morning before does feed the kids weights were recorded and the does, then were allowed to feed the kids and body weights were recorded again. Milk yield was determined and recorded as the difference in the weight pre-and post-suckling. Weekly milk yields at 7 days (MY7), 14 days (MY14), 21 days (MY21) and 28 days (MY28) were calculated as the mean of milk amount estimated in this week, and then multiplied by 7 to get the weekly milk yield. Total milk yield (TMY) of the first three weeks of suckling (TMY 21) was calculated by adding total amount of each week of the to get the total milk yield from birth up to 21 days. Mortality rate (MR) for kids during lactation was calculated as:

MR of kids = (No. Kids born alive – No. Kids at weaning)/ (No. Kids born alive)) X 100
Table (1): Ingredients and chemical composition of experimental diets.

| Item                        | Control | 15%  | 30%  | 45%  |
|-----------------------------|---------|------|------|------|
| Clover hay                  | 20.00   | 17.00| 14.00| 11.00|
| Panicum maximum             |         |      |      |      |
| Yellow corn                 | 21.25   | 21.22| 21.02| 21.02|
| Wheat bran                  | 29.25   | 29.05| 29.05| 29.05|
| Soybean meal (44%)          | 22.30   | 22.30| 22.30| 22.30|
| Lime stone                  | 0.24    | 0.24 | 0.24 | 0.24 |
| Di calcium phosphate        | 3.00    | 3.00 | 3.00 | 3.00 |
| Sodium Chloride (NaCl)      | 0.50    | 0.50 | 0.50 | 0.50 |
| Vit.& min. Mix*             | 0.30    | 0.30 | 0.30 | 0.30 |
| DL-Methionine               | 0.14    | 0.14 | 0.14 | 0.14 |
| Anticoccidia (Diclazuril)   | 0.05    | 0.05 | 0.05 | 0.05 |
| Molasses                    | 3.00    | 3.00 | 3.00 | 3.00 |
| Total                       | 100     | 100  | 100  | 100  |

Calculated analysis%:

| Item    | Control | 15% | 30% | 45% |
|---------|---------|-----|-----|-----|
| CP%     | 18.31   | 18.27| 18.24| 18.23|
| CF%     | 11.32   | 11.32| 11.34| 11.36|
| EE%     | 2.77    | 2.74 | 2.75 | 2.77 |
| NFE%    | 57.57   | 57.12| 57.42| 57.44|
| Ash%    | 10.03   | 10.55| 10.25| 10.20|
| DE kcal/kg | 2602.5 | 2602.6| 2601.4| 2606.8|
| Calcium | 1.20    | 1.21 | 1.23 | 1.20 |
| Total phosphorus             | 1.05    | 1.00 | 1.12 | 1.11 |
| Methionine                    | 0.43    | 0.42 | 0.42 | 0.42 |
| Lysine                         | 1.05    | 1.00 | 0.99 | 0.99 |

* Each per 1 kg diet: 6000 IU Vit. A; 900 IU Vit.D; 40 mg Vit. E; 2.0 mg Vit. K3; 2.0 mg Vit. B1; 4.0 mg Vit. B2; 2.0 mg Vit. B6; 0.010 mg Vit. B12; 5.0 mg Vit. PP; 10.0 mg Vit. B3; 0.05 mg B6; 3.0 mg B6; 250 mg Choline; 250.0 mg Fe; 50.0 mg Zn; 8.5 mg Mn; 5.0 mg Cu; 0.20 mg I; and 1 mg Se.

1 According to Feed composition for animal and poultry feed stuff used in Egypt (2001).

Economic efficiency:

The economic efficiency of experimental diets was calculated as the ratio between income (litter size x selling price of each rabbit at weaning) and cost of feed consumed according to Soliman et al. (2012).

Statistical analysis:

The experimental data were analyzed using general linear model using ANOVA procedures of SAS (2004) by the following model: $Y_{ij} = \mu + T_i + e_{ij}$.

Where: $\mu$ = overall mean of $Y_{ij}$, $T$ = effect of treatment, $i = (1, 2..., etc)$ and $e_{ij}$ = experimental error.

The Significant differences among treatment means were separated at alpha level (P≤0.05) by Duncan’s multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition:

As shown in Table (2), chemical analyses of Panicum maximum compared with clover hay revealed that, CP was (11.65 vs. 12.00), CF (9.18 vs. 5.72), EE (4.43 vs. 2.60), NFE (67.73 vs. 76.74), ash (13.54 vs. 2.54), DE (2647 vs. 2758), Ca (0.415 vs. 1.40), P (0.16 vs. 0.23) and tannin (1.73 vs. 3.53) and in Table (3) amino analysis in Panicum maximum compared with clover hay indicated that lysine (0.49 vs. 0.54) methionine was (0.16 vs. 0.18) and therionine (0.34 vs. 0.51). In this respect, Medugu et al. (2012) found
that *Panicum maximum* contained CP (10.5%), CF (30.4%), EE (2.5%) ash (7.5%). Miegoue *et al.*, (2018) found that *Panicum maximum* contained 91.76, 85.88, 13.45, 33.08, 2.67 and 14.12% as DM, OM, CP, CF, EE and ash, respectively. Monica and Anthonia (2016) found that *Panicum maximum* contained DM (37.0%), CP (10.5%), CF (30.4%), EE (2.5%) ash (7.5%, and 48.7% NFE).

Table (2): Chemical composition of *Panicum maximum* and clover hay (on DM basis).

| Item          | OM % | CP % | CF % | EE % | NFE % | Ash % | DE (Kcal/kg) | Tannins % | Ca % | p |
|---------------|------|------|------|------|-------|-------|--------------|-----------|------|---|
| *P. maximum* | 86.90| 11.65| 30.66| 2.76 | 13.1  | 159   | 1.73         | 0.41      | 0.16 |   |
| Clover hay    | 91.20| 12.00| 30.00| 2.10 | 8.80  | 178   | 3.53         | 0.25      | 1.40 |   |

Table (3): Amino acids analysis of *Panicum maximum* and clover hay.

| Amino acids | *Panicum maximum* | Clover hay |
|-------------|-------------------|------------|
| Lysine      | 0.49              | 0.54       |
| Methionine  | 0.16              | 0.18       |
| Therionine  | 0.34              | 0.51       |

Doe performance:

Data in Table (4) showed that effect of treatments on doe weight at mating, pregnancy and change in weight and feed intake (g/day) at pregnancy and suckling. It is noticed that doe weight at mating, pregnancy and change in weight at suckling were not affected by experimental treatments. However, change in weight at pregnant were significantly decreased with 15% and 30% *Panicum maximum*

Table (4): performance of rabbit does as affected by experimental treatments.

| Item              | Control | Experimental group | SEM |
|-------------------|---------|--------------------|-----|
|                   |         | 15%                | 30% | 45% |
| Does weight of mating | 2935.3  | 2921.6             | 2920.0 | 2925.5 | 6.69 |
| Does weight of Pregnant | 3071    | 3052               | 3045 | 3091 | 10.71 |
| *Change in weight (g)* | 165.0<sup>b</sup> | 128.7<sup>b</sup> | 125.0<sup>b</sup> | 175.0<sup>b</sup> | 8.46 |
| Does weight of suckling | 2773.3  | 2730.3             | 2746.6 | 2751.3 | 10.09 |
| **Change in weight (g)** | -162.0  | -191.3             | -173.4 | -174.2 | 5.16 |
| Feed intake (g/d) | 220.0<sup>a</sup> | 197.9<sup>b</sup> | 182.93 | 174.2 | 8.19 |

*Change in weight (g) = Pregnant weight (g) - Mating weight (g).

**Change in weight (g) = Suckling weight (g) - Mating weight (g).

<sup>a, b and c</sup>: Means in the same row with different superscripts are significantly different (P≤0.05).

compared with control, while change in weight at pregnant close to control when replacing 45% *Panicum maximum* to clover hay. Feed intake was significantly increased with replacing 15, 30 and 45% *Panicum maximum* at pregnant does and replacing 30 and 45% *Panicum maximum* at lactating does. In this respect, Ezra *et al.* (2014) concluded that pregnant rabbit fed concentrate plus mix of forage (concentrate + mixed forages of Calopogonium mucunoides, Centrosema pubescens, Tridax procumbens, *Panicum maximum* and Gomphrena spp. recorded better weight gain of pregnant rabbits. Monica and Anthonia (2016) found that final weight and weight gain were higher with rabbit doe fed on control diet without forage followed by those fed on diet containing forage 50% Calopogonium mucunoides and 50%--*Panicum*
maximum) and the least was in those fed on diet containing 0% Calopogonium mucunoides and 100% Panicum maximum. While, daily feed intake was highest for does on diet containing concentrate and forage (0% Calopogonium mucunoides and 100% Panicum maximum). Rufino et al. (2012) found that supplementation of Panicum maximum up to 1.5% live weight in concentrate for Anglo Nubian goats doe increased the feed intake of dry matter and increased the live weight.

Milk yield:

Results in Table (5) showed that does fed dietary inclusion of 45% Panicum maximum recorded significantly the highest milk yield during the four weeks of lactation compared with others groups. However, the does fed 15, 30% Panicum maximum recorded significantly lower of milk yield during the three weeks period, on the other hand, there was an insignificant decrease in milk yield at the replacement of 30% Panicum maximum during first week compared to control groups. In these respect, Rufino et al. (2012) found that supplementation of Panicum maximum up to 1.5% live weight in concentrate for anglo nubian goats doe increased milk yield. Gaafar et al. (2014) found that rabbit does fed on fibrous diets during lactation increased milk production. Also, the results confirmed with Chrastinova et al. (1997) who reported that milk yield of rabbits gradually increased until 21st day of lactation; afterwards it decreases by next 10 days. However, Abo-El-Ezz et al. (1981) mentioned that the milk yield increased by increasing the litter size. Ali et al. (2017) found that milk yield with Baladi black rabbits doe fed on 15 or 30 % conocarpus replacement of berseem hay close to milk yield with Baladi black rabbits does fed on control diet without conocarpus. Also Basyony et al. (2019) found that milk yield, during lactation periods at 2nd, 3rd and 4th week significantly increased for rabbit does fed 10.75 Salix Safsaf + 23.25 berseem hay Kg/100 Kg compared to those fed the control diet.

Table (5): Milk yield affected by experimental treatments.

| Suckling period | Control  | Experimental group |
|-----------------|----------|-------------------|
|                 |          | 15%               | 30%    | 45%   | SEM   |
| Week 1          | 76.60ab  | 64.13b            | 71.26abc | 80.32a | 2.45  |
| Week 2          | 121.21a  | 94.02c            | 105.60b  | 124.30a | 3.79  |
| Week 3          | 140.02a  | 111.00c           | 122.12b   | 140.93a | 3.72  |
| Week 4          | 123.54a  | 97.12b            | 101.20b   | 118.43a | 3.61  |

a, b and c Means in the same row with different superscripts are significantly different (P≤0.05).

Litter performance and mortality rate:

Data of litter size at birth, litter size at weaning, litter weight, litter weight gain-and mortality rate were illustrated in Table (6). The incorporation of 30% and 45% Panicum maximum in rabbit diets showed insignificant effect on litter size at birth (total), litter size at birth (live), 21day, 28day and weaning for 30 or 45% Panicum maximum compared to control. However, litter size at birth (total), litter size at birth (live), 21day, 28day and weaning were significantly decreased for rabbits fed 15% Panicum maximum compared to control. Litter weight at birth was not affected by treatments and data of litter weight and litter weight gain of kids with rabbit fed diets containing 45% Panicum maximum at week 1 until week 4 were close to data of litter weight of kids with rabbits fed control. However, inclusion of 15 or 30% Panicum maximum significantly decreased litter weight of kids compared to control and 45% Panicum maximum. Litter weight gain of kids were significantly decreased with diets containing 15% Panicum maximum compared to control and other treatments in week 1; and week 3 and litter weight gain of kids for inclusion of 15 and 30% Panicum maximum compared with control and 45% Panicum maximum in week 2. While, litter weight gain of kids was not affected by different treatments in week 4. Mortality rate was not significantly different between different treatments. In these respect, Monica and Anthonia (2016) found that the highest litter size at birth and litter size at weaning for does on fed diet containing forage 50% Calopogonium mucunoides and 50% Panicum maximum, followed by those on diets 25% Calopogonium mucunoides and 75% Panicum maximum and the least for those on diet 0% Calopogonium mucunoides and 100% Panicum maximum. Mortality rate before weaning was higher for doe fed diet containing 0% Calopogonium mucunoides and 100% Panicum maximum while no mortality with those fed diet containing 50% Calopogonium mucunoides and 50% Panicum maximum. These results agree with Ali et al. (2017) who found that baladi black rabbit does fed on 15 or 30 % conocarpus replacement of berseem hay were significantly decreased litter size at 21day, 28day and weaning compared to control without conocarpus and the same author also, found that significantly higher
Ezea et al. (2014) concluded that litter birth weights (kg) were significantly increased when rabbits fed concentrate plus mix of forage (concentrate + mixed forages of Calopogonium mucunoides, Centrosema pubescens, Tridax procumbens, Panicum maximum and Gomphrena spp.) compared to control. Basyony et al. (2019) found that average litter weight at weaning and weight gain increased for rabbits fed basal diet contained 10.75 Salix Safsaf + 23.25 berseem hay Kg/100 Kg and rabbits fed diet contained basal diet contained 17 Salix Safsaf + 17 berseem hay Kg/100 Kg compared to rabbits fed control diet and rabbits fed basal diet contained 23.25 Salix Safsaf + 10.75 berseem hay Kg/100Kg.

Table (6): Litter performance and mortality rate affected by experimental treatments.

| Item                        | Control   | Experimental group | SEM |
|-----------------------------|-----------|--------------------|-----|
|                             | 15%       | 30%                | 45% |
| Litter size                 |           |                    |     |
| Birth (total)               | 8.00      | 7.86               | 7.90| 8.00 | 0.03 |
| Birth (live)                | 7.85a     | 6.45b              | 7.60a| 7.74a| 0.20 |
| 21 days                     | 7.34a     | 6.21b              | 7.00ab | 7.43a| 0.20 |
| 28 days                     | 7.00a     | 6.18b              | 6.80ab | 7.00a| 0.13 |
| Weaning                     | 6.10a     | 5.00b              | 6.20a | 6.40a| 0.20 |
| Litter weight (g):          |           |                    |     |
| At birth                    | 331.7     | 236.7              | 263.3| 333.7| 41.28 |
| Week 1                      | 757.3a    | 617.0b             | 665.3b | 748.3a| 18.8 |
| Week 2                      | 1466.0a   | 1085.0b            | 1197.0b | 1430b| 53.13 |
| Week 3                      | 1870.0a   | 1373.0c            | 1593.0b | 1850.0a| 65.10 |
| Week 4                      | 2747.3a   | 2141.7c            | 2393b  | 2710.0a| 77.63 |
| Litter weight gain (g):     |           |                    |     |
| Week 1                      | 425.6a    | 380.3b             | 402.0ab| 414.6a| 7.42 |
| Week 2                      | 708.7a    | 468.0c             | 531.7b | 681.7a| 31.35 |
| Week 3                      | 404.0a    | 288.0b             | 396.0a | 420.0a| 18.39 |
| Week 4                      | 877.3     | 768.7              | 800.00 | 860.0| 26.12 |
| Mortality rate%             |           |                    |     |
| Kids (from birth till weaning) | 22.22    | 22.48              | 18.42| 17.31| 1.31 |

a,b: Means in the same row with different superscripts are significantly different (P≤0.05).

Economic efficiency:

Results in Table (7) indicated that the lowest total feed cost /doe (LE.) (48.46 LE) was observed with rabbits fed the diets containing 15% Panicum maximum. Results indicated that groups fed diets 45% Panicum maximum achieved the highest economic efficiency (1.50) and relative economical efficiency (101.35) followed by a decreasing order by groups fed control and the least was the group fed 15% Panicum maximum. Basyony et al. (2019) found that economic efficiency was the best for doe rabbit fed 50% Salix Safsaf replacement with berseem hay.
Table (7): Effect of experimental treatments on economic efficiency of rabbit does.

| Item                                                                 | Control | Experimental 15% | Experimental 30% | Experimental 45% |
|----------------------------------------------------------------------|---------|------------------|------------------|------------------|
| Price/kg diet                                                        | 3.82    | 3.77             | 3.72             | 3.67             |
| (Total feed consumed doe/gestation period/kg)                       | 5.487   | 5.937            | 6.600            | 5.880            |
| (Total feed consumed doe/suckling period/kg)                        | 7.360   | 6.919            | 8.946            | 8.022            |
| Total feed cost/doe (LE)                                            | 49.07   | 48.46            | 57.83            | 51.02            |
| Litter size at weaning                                              | 6.10    | 5.00             | 6.20             | 6.40             |
| Total revenue/Litter at weaning (LE)                               | 122.00  | 100.00           | 124.00           | 128.00           |
| Net revenue/doe (LE)                                               | 72.93   | 51.54            | 66.17            | 76.98            |
| Economic efficiency (LE)                                            | 1.48    | 1.063            | 1.144            | 1.50             |
| Relative economic efficiency                                        | 100     | 71.86            | 77.31            | 101.35           |

1Total revenue = Litter size x20, assuming that the selling price of each rabbit at weaning was LE (20).
2Net revenue/ rabbit doe (LE) = Total revenue/ rabbit doe (LE) - Total feed cost / rabbit doe (LE).
3Economic efficiency = Net revenue/ rabbit doe/ Total feed cost / rabbit doe (LE).

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تأثير إستبدال درس البرسيم بمستويات مختلفة من نبات البونكيام ماكسميم على الأداء التناسلي لأمهات أرانب فالين

ولاء عطية سلامة، أميره محمود رفاعى، أحمد السيد شمس الدين، فؤاد سعيد خليل و أحمد منير

عميد بحوث الانتاج الحيواني، مركز البحوث الزراعية، جيزة - مصر

استخدم في هذه الدراسة 20 أم فالين عمر 5 شهور بمسطور وزن 2.925 ± 6.69 كجم لقيم تأثير أحلال مستويات مختلفة من بونكيام ماكسميم 15, 30 و 45% محل درس البرسيم على الأداء التناسلي لأمهات أرانب. وزعت أمهات الأرانب عشوائيا إلى 4 مجموعات المجموعة الأولى تم تغذيتها على علائق علائق تتكون من درس البرسيم (% 15) والجمعيات الثانية والثالثة والرابعة على علائق تتكون من درس البرسيم (% 30 و 45) بونكيام ماكسميم. وكنتورل (% 15) بونكيام ماكسميم. وقد تخلصت النتائج كالتالي:

1- وجد نقص معنوي في التغير في وزن الجسم لأمهات الأرنبي في فترة الحمل مع 15 و 30 بونكيام بالمقارنة بالكنتورل. بينما كان النتائج في وزن الجسم يتقاب مع الكنتورل مع الأحلاف بنسبة 45% بونكيام من درس البرسيم.

2- وجد زيادة معنوية في الغذاء المأكول مع أحلال البونكيام بنسبة مختلفة في فترة الحمل والأحلال بنسبة 30 و 45% في فترة الرضاعة.

3- وزن الخلفة وزن الخلفة المكتسب مع الأرنبي التي غذت على (% 45) بونكيام يقاربة مع وزن الخلفة المكتسب مع الأرنبي التي غذت على الكنتورل. ولا يوجد فرق معنوي في معدل النفوذ.

4- سجلت كمية اللبن زيادة معنوية أثناء الأسابيع الأربعة في فترة الرضاعة بالمقارنة بالمجموعات الأخرى وتمنى تسجيل أعلى كفاءة اقتصادية في المجموعات المغذية على الأحلال بنسبة 45% بونكيام.

الخلاصة: أمكنية أحلال أرنبي البونكيام حتى مستوى 45% من درس البرسيم بعلائق أمهات الأرنبي.