

## PHASE FEEDING IN FATTENING RABBITS

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### ABSTRACT

*In this study two points were tried to be solved, the first was the effect of phase feeding successive diets, differing in calorie / protein ratio, on fattening performance and digestibility . The second point was the value of using high energy diets while maintaining the crude fiber at its high level. Two experiments were performed in this study, the first was the growth experiment and the second was the digestibility one .In experiment I, seven groups each of 12 weaned New Zealand White rabbits were fed according to different seven feeding regimens , three of them(group I , group IV and group VII) followed single feed program and fed diets 1 (2500 & 17) , 4 (2700 & 18.5 ) , and 7 (2900 kcal ,DE /kg & 19.5 % CP ) while the other four groups followed the three - phase feeding system (4 – 7 , 7-10 ,and 10 – 12 weeks of age ) and fed on diets with 2500 kcal / kg & CP % from 20 descending to 14 (group II ) and from 14 ascending to 20 ( group III ) and diets with 2700 kcal/kg with CP % from 21.5 to 15.5 ( group V ) and from 15.5 to 21.5 %(group VI). In experiment II , the digestibility of the different diets in the three phase periods was determined where 4 rabbits were borrowed at time from its respective group .Results revealed that the feasibility of feeding high energy – high protein diets to fattening rabbits . As feed conversion efficiency was linearly improved by increasing energy and crude protein , the DE and CP were efficiently used in growth as it was clear from the figures for kcal /gain : 7.75 & 9.91 vs. 10.56 and protein efficiency ratios :1.92 &1.47 vs. 1.39 for 2900 & 19.5 - , 2700 &18.5 - versus 2500 kcal, DE/kg & 17% CP -*

diets, respectively . The digestibility of dry matter, crude protein, and ether extract of diet 7 was significantly higher than that of diet 1. Comparing the single feed system with the suggested phase feeding systems indicated that beginning of fattening period on high energy and high protein – diet ( 2700 kcal, DE/kg & 21.5 % CP ) with reducing the protein level, as rabbits grew, to 18.5 and then to 15.5 % led to the most efficient fattening performance . The cost of 1 kg gain was the final judgment . There was reduction in production cost with the suggested feeding regimes to be tested below the recommended control one .The highest cost/kg gain (about 6.4 L.E.) was recorded by group I and group IV (to some extent) while the least cost (5.03) was recorded by group V with savings of about 21 % . The production cost of group II and group VI was in between. Although group V had the least cost, it was not distinctly different from group VII and group III.

*In conclusion, we recommend the three diets-system of group V to be applied or the feeding system under which group III was raised when the price of oil is high or uneconomical to be added.*

## INTRODUCTION

In recent years there has been rising in global awareness about virtues of rabbit meat production in developing countries as an alternative means of alleviating world feed shortages. This basic understanding is largely attributable to rapid growth rate of rabbits and its good reproductive performance.

Rabbits have been raised traditionally by small farmers in Egypt to provide meat for their family and also play as a supplementary income. As most rabbit farms are not large enough to justify the use of several different feeds, it is a common practice to use just one or two diets for the entire herd, a grower diet for fryers and a lactation diet for does. Also,

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rabbit feeding programs established by *NRC (1977)* and *Agricultural Ministry Decree (1996)* have been published documentary single feed system during growing or fattening period.

Now, rabbit industry becomes more intensive and food prices are so high that any saving that can be made in intake of nutrient or food, which does not affect performance, or increasing in growth efficiency, must be worth investigating.

*Cheeke (1987)* stated that the nutritional requirements of rabbits, as is true for other animals, vary according to age and productive function. For optimal feeding efficiency, diets should be formulated to meet the needs of animals of a particular age or stage of production. In swine industry, for example, it is common to have a sow gestation diet, lactation diet, creep diet, starter diet, grower diet, and finisher diet, with each one balanced to meet the requirements of pigs of a given age or function. As the pigs grow, dietary energy and protein levels can be reduced without adversely affecting performance. The protein levels range from 20 % for a starter diet to 15 % for a grower diet and 13 % for a finisher diet. Reducing the protein level as pigs grow results in substantial savings in feed cost, particularly since most of the feed in an swine operation is consumed by the growing – finishing pigs, which have the lowest protein requirements.

This was similar to what's followed in some broiler feeding system where multiple stage diets are fed basing on the assumption that amount of nutrient needed is changed as age increases. The three - phase feeding program; 0 to 3 - , 3 to 6 - , and 6 to 8 - week intervals for nutrient requirements of broilers were recommended by *NRC (1994)*. Similar relationships were true for rabbits (*Cheeke, 2005*).

Energy levels in typical rabbit diets are quite low, usually being in the range of 2400 to 2800 kcal DE / kg, where 2500 is recommended for growth (*NRC, 1977 and Agricultural Ministry Decree, 1996*) and for fattening (*Agricultural Ministry Decree, 1996*). Higher energy diets tend to promote microbial overgrowth in the cecum and lead to enteric disease. Thus rabbit diets usually contain alfalfa meal or other fibrous feedstuffs as the main ingredients although rabbits do not digest fiber efficiently (*Cheeke, 2005*).

In this study two points were tried to be solved, the first was the effect of phase feeding successive diets, differing in calorie protein ratio, on fattening performance and digestibility. The second point was the value of using high energy diets while maintaining the crude fiber at its high level.

## MATERIALS AND METHODS

### **Experimental animals and management:**

84 weaned New Zealand White rabbits of four weeks old were used for this study, which lasted eight weeks. They were obtained from a private rabbitry in Giza, Egypt. They were selected in order to constitute uniform live weight groups. All rabbits had a body weight ranging from 400 to 450 g .

Prior to the commencement of the experiment, rabbits were prophylactically treated against internal and external parasites by subcutaneous injection of Ivermectin (0.2ml/rabbit). Broad spectrum antibiotic (Pentomycin) was injected intramuscularly at a dose of 0.2ml/rabbit and Cocci-4 was used as one ml/litter of drinking water as a prophylactic drug against coccidiosis. To guard against pasteurellosis, formaldehyde-killed vaccine (0.5 ml/rabbit) was used followed by two booster doses with four weeks intervals.

The rabbits were housed in special rabbit metal cages each measuring 50X30X30 cm, arranged in a three tier - battery system. The system was equipped with facilities for feeding, drinking, and trays for collection of feces and urine. Rabbits were randomly allocated to seven treatments each of 12 animals. The seven rabbit groups were fed according to different seven feeding regimens forming the first experiment in which growth performance was tested. In a second experiment, the digestibility of the different diets in the three phases-period was determined in 21 trials using 84 rabbits, 4 in each trial, borrowed at time from its respective group. The second experiment was suggested in order to aid interpreting positive or negative results collected in the growth one.

### **Experimental design:**

#### **Experiment I-Measuring the growth performance:**

Two experiments were performed in this study, the first was the growth experiment and the second was the digestibility one.

The experimental design could be broken into two types of treatments, the first was to test increasing the energy density and related CP concentration and the second related to testing the validity of phase feeding concept. *The Agricultural Ministry Decree (1996)* advised one type of ration for the whole period of fattening assuming that the amount of nutrient needed in each age phase remains the same throughout the whole period. The suggested phase feeding included three phase periods 4-7, 7-10 and 10-12 weeks, imitating that of broiler chicken - but after weaning, designed in order to positively push the performance by increasing CP% in the early phase on the expense of the last one; and as

a compensatory growth is expected when the CP is liberally allowed after a period of deficit- the CP in the last phase is increased on the expense of the first.

In the experiment three levels of energy densities were nominated starting with the Ministerial level 2500 kcal ,DE /kg, increased by 200 kcal each time reaching to 2700 & 2900. The CP% was increased accordingly to a round figures of 18.5 and 19.5, keeping a C/P ratio of 145.9 & 148.7 as compared to 17%CP & 147.1C/P ratio in that of Ministerial recommendations . The phase protein exchange was tested with the 17 & 18.5% CP levels as the 19.5 one is too high for any increase or decrease to have an effect.

The essential amino acid methionine was kept at the same dietary level in all diets and phases as also Ca, P and Na supplements and rate of adding the premix. They were suggested not to follow energy and CP concentration as they are allowances rather than needs and not to be conflicted with a deficiency of any.

In this experiment three of the seven groups followed single feed program and fed diets 1 (2500 & 17), 4 (2700 & 18.5), and 7 (2900 kcal, DE/kg & 19.5 % CP) while the other four groups followed the phase feeding system and fed on diets with 2500 kcal / kg & CP % from 20 descending to 14 and from 14 ascending to 20 – and diets with 2700 kcal DE with CP from 21.5 to 15.5 and from 15.5 to 21.5 %.

The energy and relevant CP percentages were shown in the design table 1, and the physical and chemical composition of diets in table 3. Before formulating diets feedstuffs were analyzed for its nutrient components according to *AOAC (1990)* and results were shown in Table 2.

**Table(1):** Crude protein concentration in the different feeding systems used

Age period (weeks)	Systems / groups						
	2500 kcal / kg diet		2700 kcal / kg diet		2900 kcal/kg diet		
	I	II	III	IV	V	V	VII
	CP	CP	CP	CP	CP	CP	CP
4 - 7	17	20	14	18.5	21.5	15.5	19.5
7 - 10	17	17	17	18.5	18.5	18.5	19.5
10 - 12	17	14	20	18.5	15.5	21.5	19.5

DE, digestible energy, is expressed in kcal/kg diet while CP, crude protein, in% .

Growth patterns of the rabbits were determined by weighing them individually every week early in the morning before feeding over a total period of 56 days to determine weight gain. The intake of feed was determined weekly by weighing amounts offered and refused.

Feed intake, weight gain, feed conversion efficiency (FCR) and protein efficiency ratio (PER) were monitored, following the equations cited by *MacDonald et al. (1990)*

$$FCR = \frac{\text{Feed intake (g)}}{\text{Weight gain (g)}} \qquad PCR = \frac{\text{Gain in body weight (g)}}{\text{Protein consumed (g)}}$$

**Experiment II- Digestibility experiment:**

During the last week of each feeding stage (7<sup>th</sup>, 10<sup>th</sup> and 12<sup>th</sup> week) four rabbits from each group were transferred to wire cages that were equipped to adapt separate collection of fecal matter and urine by using fishing net hanged underneath each cage. Total daily feces voided were collected every morning from each animal for successive five days, weighed and kept in deep freezer. At the end of the five day - collection period, feces were bulked together, thoroughly mixed, oven dried and kept frozen for analysis.

Feed intake was fixed at the least intake, recorded in the first two days of the last week of each feeding stage. The daily amount allowed for each rabbit was divided into two meals, one half in the morning and the other one in the evening to reduce wastage. Feed consumption was recorded over the five days of collection period. Unconsumed feeds were collected from each animal and weighed every day in the morning before fresh feed was served.

Samples of previously bulked unconsumed feeds and feces that predried at 60°C for 48 hours before grinding were taken for chemical analysis to determine approximate composition, DM; CP; EE; ash and CF. Digestibilities of the dry matter or its nutrients were estimated using the following equation according to *McDonald et al. (1990)*:

$$\text{Digestibility of dry matter or nutrient} = \frac{\text{Dry matter or nutrient digested}}{\text{Dry matter or nutrient intake}} \times 100$$

### **Statistical analysis:**

The data were analyzed statistically using the INSTAT to calculate the mean, standard error and the significance among figures was tested using Student “t” test.

## **RESULTS AND DISCUSSION**

### **Animal performance:**

#### **One feed system with different energy densities:**

The groups I, IV and VII were treated by the one diet - system all over the eight weeks of the fattening period. The diets were of 2500 kcal, DE/kg and the protein of 17% in the first group, and with respective figures of 2700 & 18.5 and 2900 & 19.5 in the other two groups. Referring to table 5 the weekly weight gain was 220, 247 and 306 in a



respective order, a result which pointed to the feasibility of feeding high energy-high protein diets to fattening rabbits. According to *Lebas (1983)* the DE content of the diet was one of the main factors affecting the level of feed intake in rabbits. *Forbes (1995) and Xiccato (1996)* reported that the reduction of DM intake happened when feed of a higher dietary energy value was given, was as a consequence of the chemostatic regulation of appetite. These results agreed with our results where the rabbit consumed 132.5g/day in group I decreased to 129.5 in IV and 116.8 in VII. For a unit of body gain a decreased amount of feed is needed as the energy density increased where the feed conversion index in the three groups was 4.22, 3.67 and 2.67. *Maertens and De Groot (1987)* found a linear relationship between feed conversion ratio & digestible energy content of diets, for commercial rabbits from 4 to 11 weeks of age. The precise limits of this ratio were not clear. As feed conversion efficiency was improved by increasing energy and crude protein, the DE and CP were efficiently used in growth as it was clear from the figures for kcal/gain (10.56 versus 9.91 & 7.75) and protein efficiency ratios (1.39 versus 1.47 & 1.92). Comparing these results with the study of *Lebas (1975 a)* on the performance of growing rabbits fed diets differing in energy content, indicated that there was disagreement because they found that about 9.5 kcal of DE was required per gram of body weight gain, regardless of energy content of the diet. Conclusively the cost of body weight gain decreased from 6.42 L.E/kg gain with the 2500 kcal-diet to 6.36 and 5.14 in the 2700 & 2900 kcal, respectively.

### **The three - phase systems:**

In order to compare the data of phase feeding - groups with that of group I, the figures were arranged in three phase periods even in the first group in which one diet-system was used considering it a control for comparison.

## **Diets with 2500 kcal, DE / kg:**

### **Phase I (4 -7 weeks):**

The crude protein percentages in a respective order were of 17, 20, and 14 units while the energy was fixed at 2500 kcal. The increase in body weight followed the percentage of protein where it was 600 g with the 17 %, increased to 654 with 20 % and decreased to 522 g with 14( Table 4 ) . The increase in body weight did not compare well with units increased or decreased in protein. It was an increase of 2.6 g / d and a decrease of 3.7 g on the other side. On the reverse increasing the CP from 17 to 20 decreased feed intake by 68 g in the 3 weeks and improved the feed conversion index from 3.3 to 2.92 while decreasing the protein to 14 % increased feed intake by 168g and the feed conversion retreats from 3.3 to 4.1.

### **Phase II (7- 10 weeks):**

The three groups were fed the same diet having 2500 kcal, DE/kg and 17 % CP , and in spite of this phase I – high CP still has a continued effect , it increased the body gain by 76 g , decreased feed consumption by 380 g and improved feed conversion ratio from 4.26 in group I to 3.41 .On the other side allowing the animals high – protein diet (17 % ) after a phase of protein deficit in group III did not have the increasing effect on feed intake but on the reverse a decreasing one ( a decrease of 754 g ) but on the other hand improved greatly the feed conversion from 4.26 to 2.79 , a score in excess of group II ( Table 4) . This was because the weight gain in group III surpassed that of group II by 51 g in the three weeks – period.

**Phase III (10 –12 weeks):**

The effect of phase I – 20 % CP – diet (group II) continued in the third phase in spite of decreasing the protein to 14 %, but with a small improvement in body gain (58 g) and feed conversion index (5.01 versus 5.52 in group I) and feed intake, on the reverse, slightly increased (83 g). In group III where protein was increased to 20 % in order to compensate the phase of protein deficit, it highly increased the gain (600 versus 405 g in group I) and improved the feed conversion to the degree that 3.74 kg feed is needed for 1 kg body gain compared to 5.52 kg food in the first group. This could be explained by the report of *Lawrence and Fowler (1997)* that rabbits exhibited compensatory growth during the recovery period where their growth rate accelerated and exceeded those achieved by comparable animals fed well and continually.

**The total fattening period (4 -12 weeks):**

Comparing the three systems together clarified that group III won and giving animals a diet deficient in protein for 3 weeks, then the protein increased gradually to 20% give more body gain by about 14% and decreased food needed for 1 kg gain by 19%. Increasing protein concentration in phase III in which the animal consumed about 33% of the total feed intake in the whole fattening period means increasing the cost of production. One kg of a diet of 20% CP costs 1.62 L.E. compared to 1.52 for the 17% CP and 1.43 for the 14% one. In spite of this, the cost of 1 kg gain was the final judgment; it was 6.42, 5.51 & 5.22 for the three groups respectively with the third group surpassing (Table 5). So planning for a compensatory growth by limitation followed by liberal allowance was better than increasing protein percentage over the needed level to push rate of growth.

### **Diets with 2700 kcal, DE / kg:**

While the level of energy was fixed at 2700 kcal all over the fattening period, the protein concentration was decreased from 21.5 % in phase I to 18.5 in phase II to 15.5 in phase III for group V and was increased from 15.5 to 18.5 and to 21.5 % for group VI in the three successive phases.

#### **Phase I (4 – 7 weeks):**

The data illustrated in table 4 showed that there was slight but significant decrease in body weight of group VI compared with group I which translated in insensible decrease in its body gain (595 vs. 600 g). The high energy and high protein – diet caused significant increase in body weight of group V (1182 versus 1046 g for G I) which gained more weight (25 %) than did those of group I. The superiority of group V in gain of weight was not associated with the least feed intake among groups but when the amount consumed was attributed to gain they had the most efficiency of feed utilization (2.55 ,3.14 & 3.30 in G V ,G VI , & G I , respectively) .

#### **Phase II (7 –10 weeks):**

The control group behaved the same trend that followed in phase I where it had the least gain ( 752 g compared with 844 and 921 in G V and GVI ) which cost much more feed at the rate of about 4.3 kg / kg gain versus 3.06 in GV & 2.83 in G VI . The high - protein diet (18.5 %) after a phase of protein deficit in group VI led to the most efficient performance in the form of the highest gain in weight and the best feed conversion ratio which reflected in the most efficient utilization of the digestible energy and protein (7.63 kcal vs. 10.65 & 8.25 and 1.91 vs. 1.38 &1.77, in groups I and V, respectively).

### **Phase III (10 – 12 weeks):**

The effect of phase I – 21.5 % CP – diet ( group V) continued in the third phase in spite of decreasing the protein to 15.5 %, with a highly improvement in body gain (265 g), feed conversion index (3.15 versus 5.52 in group I) and protein efficiency ratio (2.05 vs. 1.06) and the lower intake of feed and of DE required for each gram of body gain(151 g /d & 8.49 kcal and 160 & 13.81 in GV & G I, respectively). Generally this group achieved the most efficient performance among treatments. In group VI where protein was increased to 18.5 % in order to compensate the phase of protein deficit, it highly increased in gain(636 versus 405 g in group I) and improved the feed conversion to the degree that 3.53 kg feed was needed for 1 kg body gain compared to 5.52 kg food in the first group.

### **The total fattening period (4 to 12 weeks):**

Results presented in table 5 demonstrated the fattening performance of rabbits groups raised under different feeding systems during the whole fattening period . The data clarified that the start of rearing rabbits for fattening on high protein and high energy- diet (2700 kcal DE & 21.5 % CP) with gradual and periodical reduction in protein level as rabbits grew ( GV) increased the gain by about 29 % and decreased feed required to produce 1 kg gain by 11%. Also the VI - phase feeding program succeeded to achieve improvement in gain by about 22% and to reduce the amount of feed needed per 1 kg gain to3.12 versus to 4.22 in group I.

### **Economical efficiency:**

Comparison between the recommended Ministerial feeding system for fattening rabbits and the suggested ones was based on the feed economy which considered as a preferential point .The cost to produce

one kilogram of each diet was presented in Table 4. Increasing the protein or /and energy contents of the diets led to increase in feed cost due to increase the inclusion levels of soybean meal and the addition of oil in diets . The cost of one percent unit of protein over that of control diet were 0.035 L.E. and about 0.158 L.E. for each 200 kcal increase in DE concentration above 2500 kcal.

From an economic standpoint, there was reduction in production cost with the suggested feeding regimes to be tested below the recommended control one .The highest cost/kg gain (about 6.4 L.E.) was recorded by G I & G IV (to some extent) while the least cost (5.03) was recorded by G V with savings of about 21 % . The production cost of G II and G VI was in between. Although G V had the least cost, it was not distinctly different from G VII& G III.

### **Digestibility coefficients:**

#### **Dry matter digestibility:**

The total digestibility of dry mater consumed by control group during the total feeding period was poorer than the others except group III .It showed significant difference from group II at 7 & 10 weeks of age (69 & 72 vs. 79 & 81%, respectively) and from group V at 12<sup>th</sup> week (69 vs. 80%). The highest efficacy of DM digestibility (85%) was achieved by group VII which highly significantly differed from control group at the three age- periods (about 1.2 times). This was attributed to the reduction of DM intake, which occurred with feed of a higher dietary energy value, was associated with a lower transit time of digesta and consequently led to increased digestion efficacy (*de Blas & Wiseman, 1998*).

### **Crude protein digestibility (CPD):**

It is commonly accepted that an increase in the CP content of feedstuff increases its crude protein digestibility because the proportional contribution of endogenous nitrogen to total fecal nitrogen decreases (*de Blas and Wiseman, 1998*). The data of our study which was shown in table 6 confirmed this report where the digestibility of CP by the control group in phase I was of percent units lower than that of higher protein-diets by about 2 to 13. Also crude protein digestibility (CPD) increased when rabbits were transferred from low protein to high protein-diet as in group III. All over the fattening period, control group digested protein with the least efficacy while the most efficient protein digestibility was achieved by GVII.

### **Ether extract digestibility (EED):**

The digestibility of EE ranged from 63-65% in the three non - added fat groups (G I, G II & G III) while with addition of about 4% fat the digestibility coefficient increased reaching to average of 0.79 among G IV, G V, and G VI . The increase of the inclusion level to 7% highly significantly improved the digestibility by 22% than the control group. The same observation was previously recorded by *Maertens et al.(1986)* where EED of a non - added fat diet which contained 2.5-3% of structural lipids linked to vegetable cell walls, was rather low (0.45-0.65). In three diets with 0 , 3 & 6% added fat, *Santoma et al. (1987)* observed a significant increase in EED as fat level increased (0.64, 0.75 & 0.79 respectively) without any significant difference between fat

sources. These data was confirmed by *Fernandez et al. (1994)* using diets with different types of fat (beef tallow, oleins or soybean oil) and inclusion levels (3 & 6%). These authors found EED of 0.48 for a conventional non-added fat diet, 0.71-0.76 for 3 g and 0.80-0.83 for 6%.

The digestibility efficiency for fat, as well as for other nutrients seemed to vary during the life of rabbit. Digestion coefficient of different nutrients tended to either decrease or remain constant with age, but EED seemed to follow a different trend. The range of lipid digestibility values was 59-62% & 71-83% at 7<sup>th</sup> week of age and rose to become 66-67 and 77-88% at 12<sup>th</sup> week for the first three group of non - added fat and the rest treatments of fat addition, respectively. *Evans and Jebelian (1982)* observed increasing EED from 0.78 at 5 weeks to 0.82 at 8 weeks. *Xiccato and Cinetto (1988)* confirmed these results with EED rising from 0.72 (7 weeks) to 0.79 (12 weeks), on the other hand, *Fernandez et al. (1994)* observed higher EED values in recently weaned rabbits (5 weeks) than in finishing rabbits (10 weeks).

### **Crude fiber digestibility**

There were no significant differences among treatments in digestibility of crude fiber. The values ranged from 16% in control group to about 20% in Group VI. Slight improvement in CF digestibility was observed with groups fed high energy diets.

## **CONCLUSION**

From the data of fattening performance, digestibility, and economical efficiency we can recommend the three diets-system of G V to be applied or the feeding system under which group III was raised when the price of oil is high or uneconomical to be added.













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## التغذية المرهلية في أرانب التسمين

أحتوي هذا العمل علي هدفين إحداهما دراسة تأثير استخدام نظام التغذية المحلية ذات العلائق المتعددة والمختلفة في معدل البروتين إلى الطاقة علي كفاءة التسمين ومعدلات الهضم . أما الهدف الثاني هو تقييم استخدام العلائق العالية في الطاقة وكذلك البروتين مع المحافظة علي الألياف عند مستواها العالي . ولتحقيق ذلك تم إجراء تجربتين الأولى لقياس كفاءة النمو والثانية لتعيين معدلات هضم العلائق . اشتملت التجربة الأولى علي 7 مجموعات من الأرانب تتكون كل منها من 12 أرنب مفطوم نيوزلندي أبيض اللون - غذيت هذه المجموعات علي 7 أنظمة غذائية مختلفة ثلاثة منهما أتبع معها نظام العليقة الواحدة خلال فترة التسمين حيث غذيت علي عليقه رقم 1 ( 2500 كيلو كالورى طاقة مهضومة و17 % بروتين خام ) ، العليقه رقم 4 ( 2700، 18.5 ) والعليقه رقم 7 ( 2900 ، 19.5 ) بينما الأربعة مجموعات الأخرى أتبع فيها نظام التغذية متعددة العلائق في ثلاث مراحل عمرية (4-7 ، 7-10 ، 10-12 أسبوع) أحتوي أحد الأنظمة علي علائق بها طاقة مهضومة 2500 كيلو كالورى / كجم مع نسب بروتين تبدأ من 20% وتقل تنازليا إلى 14% (المجموعة الثانية ) أو تزداد تصاعديا من 14% إلى 20% (المجموعة الثالثة ) والنظام الثاني أحتوي علي 2700 كيلو كالورى / كجم ونسب بروتين تبدأ من 21.5 تقل إلى 15.5% (المجموعة الخامسة ) أو من 15.5 وتزداد إلى 21.5 % (المجموعة السادسة ) - أما التجربة الثانية فتم فيها تعيين معدلات هضم اللائق المختلفة في الفترات العمرية الثلاثة باستخدام 4 أرانب لكل تجربة تم استعارتها من المجموعة التابعة لها .

أظهرت النتائج إمكانية استخدام العلائق العالية في الطاقة وكذلك العالية في البروتين حيث تحسنت معدلات التحويل الغذائي كلما زاد مستوي الطاقة والبروتين في العلائق كما كانت أعلى معدلات هضم للمادة الجافة والبروتين ومستخلص الإثير في المجموعة رقم 7 بفروق معنوية عن مثيلاتها في المجموعة الضابطة (1) . وبمقارنة نظام العليقة الواحدة بالأنظمة متعددة العلائق يتضح الآتي : أن بدأ فترة التسمين علي العليقة العالية في الطاقة والبروتين (2700 كيلو كالورى و 21.5 % ) مع تقليل مستوي البروتين الي 18.5 ثم الي 15.5 % كلما زاد عمر الأرنب حقق أقصى كفاءة إنتاجية لأرنب التسمين . وتعتبر تكلفة إكجم زيادة في الوزن هي الحكم النهائي للمفاضلة بين الأنظمة الغذائية المختلفة . سجلت المجموعة الأولى أعلى تكلفة إنتاج (6.40 جنيهه) بينما حققت المجموعة الخامسة أقل تكلفة (5.03 جنيهه) والتي لم تزيد زيادة واضحة عن التكلفة في المجموعات الثالثة والسابعة .

وبذلك نوصي باستخدام نظام الثلاث علائق المطبق في المجموعة الخامسة في تسمين الأرانب أو استخدام نظام المجموعة الثالثة في حالة ارتفاع سعر الزيوت وتصبح أضافتها غير اقتصادية.