



Chickpea Feeding Promotes Weight Gain in Guinea Pigs

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Abstract | The present study was conducted to determine the effect of chickpea and carrot feeding on body weight gain of guinea pigs. For this purpose, guinea pigs (n=8, 4 male+4 female) were divided in 2 groups: group A was fed with chickpeas, and group B with carrots. Both groups were given access to water ad-libitum. The observation was recorded on body weight from day 4 to 14 (0-10 days). The results indicated that average body weight gain of male and female guinea pigs in group A was 7.2±0.80 g and 6.9±0.47 g, while, in group B it was 3.7±0.26 g and 3.1±0.23 g, respectively. A 48.61 and 55.07% higher weight gain was recorded in male and female animals of Group A, respectively, than in group B. The data revealed that average body weight gain of guinea pigs in group A (where the animals were fed on chickpeas) were linearly increased from day 1 to day 10. The results further concluded that male animals gain higher body weight than the female in both groups. The ANOVA demonstrated a significant (P<0.05) difference in average body weight gain of guinea pigs from day 0 to day 10 among the groups, however no significant (P>0.05) difference in average body weight gain (g) of guinea pigs was noted between male and female animals. It was concluded that guinea pigs gained rapid body weight gain when supplemented with chickpeas as compared to carrot feeding.

Keywords | Chickpea, Carrot, Guinea pig, feeding, Weight gain

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INTRODUCTION

Chickpea (*Cicer arietinum*) a leguminous crop, is an important source of dietary proteins. It is a major pulse crop in the world, accounting for 14% (FAO, 1998) of world pulse production (Singh et al., 1991). Chickpeas are also a good source of dietary minerals, such as calcium, phosphorus, sulphur etc and also have a higher metabolizable energy as compared to other several other legumes. Chickpea is a multipurpose grain legume that widely used around the world, notably as a source of protein (Bejiga et al., 2006). Chickpea seeds of the Desi type are generally consumed as a dry pulse, whole, split, or ground as dhal or flour, and in sauces such as hummus or soups (Bejiga et al., 2006; van der Maesen, 1989). Kabuli types are used for sal-

ads, vegetable mixes and can be canned; several by-products of chickpea cultivation and processing are used for pigs feeding.

Studies have declared that ruminants grow equally well or even better when soybean or cereal meals were replaced with chickpea. Pigs also showed the same performance, but growing pigs experience a negative effect of raw chickpea feed; extruded chickpea can increase performance even in growing pigs (Canibe and Eggum, 1997). Poultry feeding trails of chickpea have also acknowledged positive effects on growth and feed conversion ratio (Cowieson and Aca-movic, 2001).

The carrot (*Daucus carota*) is a root vegetable, usually

Table 1: Average body weight (g) of guinea pigs by intake of chickpea and carrot from day 0 to day 10

Group	Group A (Chickpea)		Group B (Carrot)	
	Male	Female	Male	Female
Day 0	448.25±0.62 ⁱ	348.75±0.47 ⁱ	440.50±2.02 ^g	349.75±1.79 ⁱ
Day 1	451.25±3.72 ⁱ	350.75±3.25 ^{hi}	442.25±4.11 ^{fg}	352.25±3.42 ^h
Day 2	458.25±3.72 ^{hi}	355.25±4.62 ^{hi}	445.75±4.28 ^{fg}	353.00±3.71 ^h
Day 3	465.25±3.72 ^{gh}	362.25±4.62 ^{gh}	449.25±4.34 ^{cf}	355.50±3.84 ^f
Day 4	472.00±3.69 ^{fg}	368.50±4.66 ^{fg}	453.50±4.83 ^f	358.75±4.09 ^{fe}
Day 5	480.50±4.55 ^{cf}	375.75±4.58 ^{cf}	458.75±5.58 ^c	360.75±3.77 ^c
Day 6	486.75±4.44 ^{de}	381.75±5.13 ^{de}	462.25±4.36 ^{cd}	363.50±3.52 ^d
Day 7	495.25±4.98 ^{cd}	390.50±5.32 ^{cd}	466.75±3.68 ^c	367.75±3.77 ^{bc}
Day 8	501.50±4.64 ^{bc}	398.25±4.93 ^{bc}	474.50±3.68 ^{ab}	371.50±23.67 ^{bc}
Day 9	509.25±4.71 ^{ab}	406.75±4.71 ^{ab}	478.00±3.69 ^{ab}	375.75±23.87 ^{ab}
Day 10	520.00±4.56 ^a	417.50±5.20 ^a	484.00±3.69 ^a	380.50±23.97 ^a
Total Weight gain	72.00±2.2	69.00±1.8	37.00±1.81	31.00±1.0
Average Weight gain (g/guinea pig/day)	7.2±0.80	6.9±0.47	3.7±0.26	3.1±0.23

^{a-i} Mean values in a column with different letters indicates significant difference at probability level of 0.05

orange in colour. It has a crisp texture when fresh. Carrots are widely used in many cuisines, especially in the preparation of salads, and carrot salads are a tradition in many regional cuisines (Abdel-Aal et al., 2013). The carrots are rich in β-carotene, and have less amounts of α-carotene, γ-carotene, lutein and zeaxanthin. These contains 88% water, 4.7% sugar, 2.6% protein, 1% ash, and 0.2% fat. These are also a good source of dietary fiber and several vitamins like vit K, vit B6 etc. (Michael et al., 1999).

Guinea pigs are used a laboratory animals and reared in animal houses, where they feed vegetables, grains grass etc. The fast growth/weight gain of guinea pigs is a desirable component in order to fulfill the requirement of lab experiments. The objective of this study is to explore the effects of chickpea and carrot feeding on the weight gain of guinea pigs.

MATERIALS AND METHODS

A total of 8 guinea pigs of 3 month age were purchased from local market of Karachi and brought to the Animal House, Department of Veterinary Parasitology, Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University, Tando Jam. The animals were left for 3 days for their acclimatization and feeding trail was done from 4th to 14th d (0 -10 day). The guinea pigs were divided into two groups viz., group A and group B each group having four guinea pigs (2 male and 2 females). The animals in group A were supplemented with 100 gm as a dietary chickpea intake, while guinea pigs in group B were fed on 150 gm carrots. These intake doses were adjusted according to their average body weight and nutritional worth of the feeds. The carrots were used fresh while, chickpeas

were used in dried form, however before feeding to animals those were soaked in the water. The water was provided ad-libitum throughout the experimental period. The animals were kept in cages individually at room temperature and relative humidity. Daily body weight of guinea pigs in both the groups was noted from day 0 to day 10. The initial body weight (at day 4) of male and female guinea pigs of group A was 448.25±0.62 g and 348.75±0.47 g, while for group B was 440.50±2.02 g 349.75±1.79 g respectively. The collected data were analysed using statistical package “Statistix version 8.0” and the means were compared by applying least significant difference at probability level of 0.05. DMRT (Duncan Mean Range Test) was also applied for knowing the significant difference between days and groups. The results were interpreted and presented in results section.

RESULTS AND DISCUSSION

As shown in Table 1, the average body weight gain of male and female guinea pigs in group A was 7.2±0.80 g and 6.9±0.47 g, while, in group B it was 3.7±0.26 g and 3.1±0.23 g respectively. The ANOVA demonstrated that significant (P<0.05) difference were observed in average body weight gain of guinea pigs from day 0 to day 10 among the groups A and B. A 48.61 and 55.07% higher weight gain was recorded in male and female animals of Group A respectively than group B. However, no significant (P>0.05) difference in average body weight gain (g) of guinea pigs was noted between male and female animals (male to male and female to female). Statistical analysis of variance further stated that average body weight (g) in group A (male and female) were significant and linear from day 0 to day 10. The results further concluded that male animals gain high-

er body weight than the female in both groups.

Laboratory animals like mice and guinea pigs are used as animal model in basic biomedical and clinical research. Applied research has been central to utmost of the achievements of modern medicine through the use of animal models. Nowadays, research have targeted the devastating pathogens for development of vaccines against the diseases caused by them (Roslindawani et al., 2016). It needs, sometimes accelerated growth of laboratory animals to use their young ones in clinical trials.

Guinea pigs are known as the central to the research of cardiovascular diseases. As guinea pigs are very similar to humans in terms of circulating cholesterol and transport of LDL cholesterol. Young guinea pigs grow rapidly for the initial 4-6 months of age (average weekly weight gain: 20-30g). The growth rate becomes slow as they come close to their genetically determined body weight i.e., 800-1500 g, and this weight is usually achieved by most of guinea pigs in 9-12 months (Fernandez and Volek, 2006). Chickpea are known as the rich source of protein (about 29%). Previous studies have declared that protein-rich diets could increase the production performance of ruminants (Aldoori et al., 2015; Ali et al., 2016) and non-ruminants (Ahossi et al., 2016). Our results have also suggested that protein-rich diet (chickpea supplementation) could increase the weight gain in guinea pigs.

The enhanced growth rate in chickpea group could be attributed to phytohaemagglutinin (PHA) contents of chickpea. PHA is a lectin found in plants, particularly in legumes (eg. beans, chickpea, etc.) that has a number of effects on cell metabolism. A recent study on suckling rats fed phytohaemagglutinin (PHA) had showed increased growth and development of the intestinal tract. PHA (0.05 mg/g body weight) was fed to 14 d old rats in single dose and its effect on gut epithelium and pancreas were investigated for 3 d after treatment. During first 24 h the PHA bind with gut mucosa and subsequently altered the gut morphology along with villi shortening and reduction of macromolecular absorption capability and disaccharidase activities. After 1 to 3 d, there was an enhanced uptake of PHA by enterocytes along with reduced binding of PHA was observed. Significantly increased gastrointestinal growth along with crypt cell proliferation was also observed during this phase together with enhanced maltase and sucrase activities and the low macromolecular absorption capability which leads to maturation of functional capacity of gut (Linderoth et al., 2006).

CONCLUSIONS

It was concluded that guinea pigs gained rapid and superior body weight gain when supplemented with chickpea

as compared to carrot feeding. Moreover male guinea pigs gained higher body weight than the females regardless of feeding treatment it was recommended that guinea pigs must be fed on chickpea (*Cicer arietinum*) for better body weight gain.

CONFLICT OF INTEREST

There is no conflict of interest.

AUTHORS' CONTRIBUTION

Dr A.G. Arijo was supervisor, Kanwar Kumar Malhi helped in draft writing and correspondence, Mujahid Ali Shah, Abdul Khaliq Samoon, Mir Azeem Talpur and Naqash Goswami were main workers of this research project and analysis.

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