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## The Effect of Potato Peels and Ascorbic Acid on The Internal Organs of Poultry

Asem Ramadan Amar Mohamed<sup>1\*</sup>, Abdul hakim Khalefah Alour<sup>2</sup>, Farag Elmhdi Jabreil<sup>3</sup>,  
Musab Salim Aboulqassim Madi<sup>4</sup>

<sup>1,2,3,4</sup> Faculty of Veterinary Medicine and Agriculture, Institute University of Zawia, Al-Ajeelat,  
Libya

\*Corresponding author: [as.mohamed@zu.edu.ly](mailto:as.mohamed@zu.edu.ly)

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### Abstract:

This work was carried out at the Faculty of Veterinary Medicine and Agriculture, University of Zawia, in April 2023, to compare the beneficial effects of dietary potato peels and vitamin C supplementation on the internal organs of poultry. The investigation was conducted on 75 one-day-old broilers, and the birds were divided into five groups of fifteen chicks each.

The first group was the control group and fed on a normal diet, the second group was fed on a diet with ascorbic acid 200 mg/kg. The potato peels were added to the diets of the third group at 50 mg/kg, the fourth group at 100 mg/kg, and the fifth group at 200 mg/kg, respectively.

The results showed no significant differences in live body weight or the weight after cavitation.

The spleen, the gizzard, and the pancreas weight showed no significant differences between the treatments at  $p < 0.05$ .

The weight of the liver, the heart, and the kidney, there were significant differences between the different treatments compared to the control group, the group fed with pp 100mg/kg recorded a slight difference at the heart level compared to the other treatments at the level  $p < 0.05$  2.095a, while the treatment fed with pp 200mg/kg recorded a significant difference at the kidney level, 1.811a compared to the control group.

The weight and length of the intestine, and the cecum results showed no significant differences between the treatments.

**Keywords:** Potato Peel, Feed Additives, Internal Organs of Chicken.

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### تأثير قشور البطاطا و حمض الاسكوربيك على الاحشاء الداخلية في الدواجن

عاصم رمضان عمار محمد<sup>1\*</sup>، عبد الحكيم خليفة العر<sup>2</sup>، فرج المهدي علي جبريل<sup>3</sup>، مصعب سالم ابوالقاسم مادي<sup>4</sup>  
<sup>1,2,3,4</sup> كلية الطب البيطري والزراعة، جامعة الزاوية، العجيلات، ليبيا

### الملخص:

تم تنفيذ هذا العمل في كلية الطب البيطري والزراعة جامعة الزاوية في أبريل 2023 لمقارنة التأثيرات المفيدة لقشور البطاطس الغذائية ومكملات فيتامين C على الأعضاء الداخلية للدواجن. أجريت الدراسة على 75 دجاجة لاجم بعمر يوم واحد، وتم تقسيم الطيور إلى خمس مجموعات تضم كل مجموعة خمسة عشر فرخاً.

المجموعة الأولى كانت مجموعة السيطرة وغذيت على عليقة عادية، والمجموعة الثانية غذيت على عليقة تحتوي على حامض الاسكوربيك 200 ملجم/كجم. أضيفت قشور البطاطس إلى علائق المجموعة الثالثة بجرعة 50 ملجم/كجم والمجموعة الرابعة بجرعة 100 ملجم/كجم والمجموعة الخامسة بجرعة 200 ملجم/كجم على التوالي. أظهرت النتائج عدم وجود فروق ذات دلالة إحصائية في وزن الجسم الحي أو الوزن بعد التجويف. لم يظهر وزن الطحال والقوانين والبنكرياس أي فروق ذات دلالة إحصائية بين المعالجات عند  $P < 0.05$  في وزن الكبد والقلب والكلية، كانت هناك فروق معنوية بين المعاملات المختلفة مقارنة بالمجموعة الضابطة، سجلت المجموعة المغذية بـ 100 ملجم/كجم فرقاً طفيفاً على مستوى القلب مقارنة بالمعاملات الأخرى عند مستوى وزن الكبد والقلب والكلية. في حين سجلت المعاملة المغذية بـ 200 ملجم/كجم فرقاً معنوياً على مستوى الكلى 1.811 مقارنة بمجموعة السيطرة. أظهرت نتائج وزن وطول الأمعاء والأعور عدم وجود فروق ذات دلالة إحصائية بين المعاملات.

**الكلمات المفتاحية:** قشر البطاطس، إضافات الأعلاف، الأعضاء الداخلية للدجاج.

## Introduction

The agricultural sector with the fastest rate of growth is poultry production [1].

The availability and cost of feeds have been directly impacted by the rising demand for animal products during the past few years [2].

The traditional substances that are used to feed chickens are becoming more and more expensive. Further investigation into the possible use of readily available, less expensive, and less competitive local products as feedstuffs has become necessary as a result. The wastes generated during the manufacturing of agro-industrial goods are one of these substitutes. Using these materials as ingredients for chicken feed could be an effective method to use them [3].

One of the most inexpensive agro-industrial byproducts is potato peels, which are produced in enormous numbers during the processing of potatoes for food and industrial uses and provide disposal issues in the majority of producing locations [4].

The practice of feeding animals with agricultural byproducts dates back to the time when animals were domesticated [5].

Numerous physiologically active substances, including phenolic compounds, minerals, vitamins, amino acids, dietary fibers, and starch, can be found in potatoes. Additionally, it has antioxidant-rich substances such as flavonoids, phenols, carotenoids, and vitamins C and E [6].

In many studies conducted with vitamin C, positive effects like an increase in feed intake, body weight increase, taste improvement, and antioxidant and antimicrobial properties, have been reported [7,8].

Potato peels can serve as an excellent substitute for synthetic chemicals in the food business as a natural source of antioxidants [9].

Potatoes generate phenolic chemicals in reaction to invaders such as viruses, bacteria, insects, and fungi [10].

Furthermore, extracts from potato peels showed antimicrobial activity [11].

In this respect, the inclusion of fibrous feeds such as potato peels in broiler diets may have a beneficial effect on nutrient digestibility and gut morphology.

Because of the nutritional and biological properties contained in potatoes and due to the lack of local studies on their use as sources of phytochemical compounds in the diet of poultry, this study was designed to determine the possible beneficial effects of dietary potato peels and vitamin C supplementation on the internal organs of poultry.

## Materials and Methods

This study was carried out in April 2023, the investigation was conducted on 75 one-day-old broilers, that were brought from the same city (Janzur City), and the birds were divided into five groups of fifteen chicks each. The chicks were reared under a cage breeding system. The breeding house temperature was kept within the normal range. The first group was considered as a control group and an independent group at the same time, which fed on a normal diet without any additives, and the second group was fed on a diet with ascorbic acid 200 mg/kg. The peels were sun-dried and milled before analysis and then incorporated into the diets of the third group at 50 mg/kg, the fourth group at 100 mg/kg, and the fifth group at 200 mg/kg, respectively.

The present experimental work was carried out at the Research Laboratory belonging to the Faculty of Veterinary Medicine and Agriculture (Al-Ajeelat), University of Zawia.

## Sample collection and laboratory examination

Collection of Internal Organs Samples:

At the end of the feeding trial, birds from each treatment group were selected based on average body weight. They were fasted overnight to empty their gastrointestinal contents, and slaughtered. The birds were then de-feathered, cut into small pieces, and expressed as a percentage of carcass weight, while organ weight was also measured and expressed as a percentage of live weight.

### Statistical Analysis

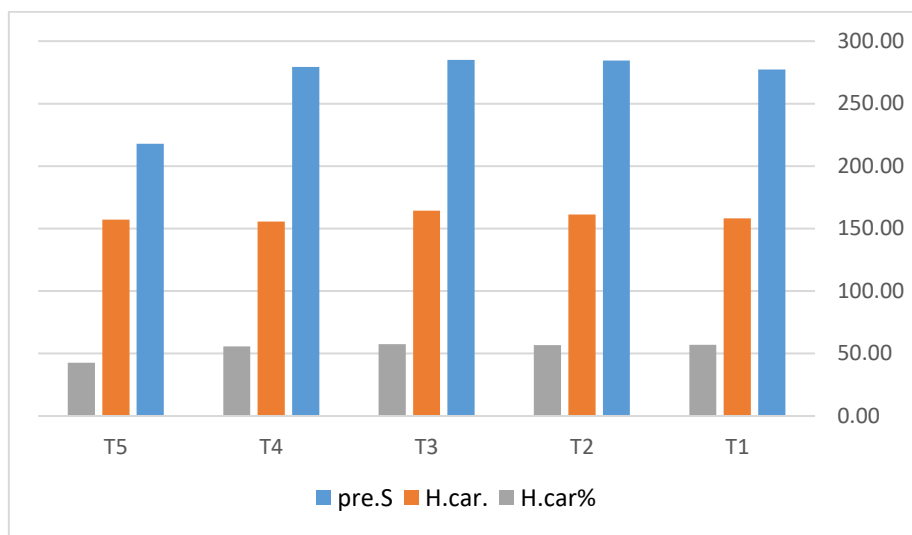
The data of this study were analyzed statistically by one-way randomized block at a significant level of 5% using the Co-Stat software program for data manipulation and statistical analysis. 2008 Version 6.45.

### Results And Discussion:

Table (1) and Figure (1) show the live body weight pre-slaughter (Pre.S), as well as the body weight after cavitation called the hollow carcass (H.car), and the percentage of cavitation or percentage of the hollow carcass (H.car%). It is noted that there are no significant differences in body weight between the different treatments compared to the control. [12] found that there are significant decreases in the final live weight and body weight change of birds as a result of increasing the level of potato peels in the feed from 0 to 30%.

**Table 1** The live body weight, the body weight after cavitation, and the percentage of cavitation in different treatments.

Treatments	pre.S	H.car	H.car%
Control	277,35a	158,20a	57,015a
Vit.C 200mg/ kg	284,38a	161,20a	56,703a
pp50mg/ kg	284,95a	164,23a	57,613a
pp100mg/ kg	279,28a	155,55a	55,660a
pp200mg/ kg	217,78a	157,08a	42,703a

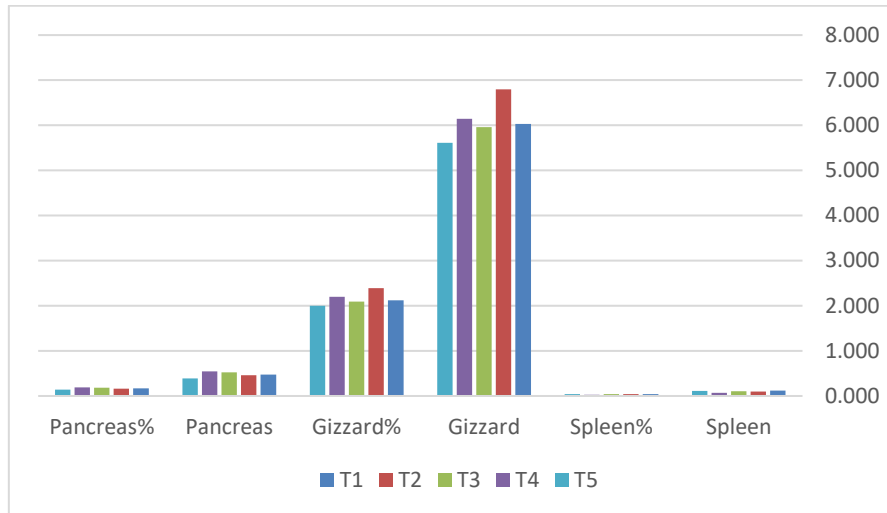


**Figure 1** The live body weight, the body weight after cavitation, and the percentage of cavitation in different treatments.

Table (2) and Figure (2) show the weight of the spleen, as well as the weight of the gizzard and pancreas in the chickens. According to the results, there were no significant differences between the treatments at the  $p < 0.05$  level. However, the group that received 200 mg of vitamin C recorded the lowest value when compared to the control group, and the treatment (pp 100mg/kg) showed a slightly significant increase in pancreas values among the treatments, with the highest numerical value of 0.542a. Commercial broiler breeders' diets including ascorbic acid did not result in any advantageous reproductive response, as demonstrated by experimental groups by [13].

**Table 2** The weight of the spleen, weight of the gizzard, and pancreas in the different treatments.

Treatments	Spleen	Spleen%	Gizzard	Gizzard%	Pancreas	Pancreas%
Control	0,116a	0,043a	6,028a	2,120a	0,472a	0,170a
Vit. C 200mg/ kg	0,100a	0,039a	6,797a	2,389a	0,457a	0,161a
pp50mg/ kg	0,103a	0,039a	5,962a	2,092a	0,525a	0,183a
pp100mg/ kg	0,068a	0,025a	6,144a	2,200a	0,542a	0,193a
pp200mg/ kg	0,113a	0,041a	5,610a	2,000a	0,392a	0,139a

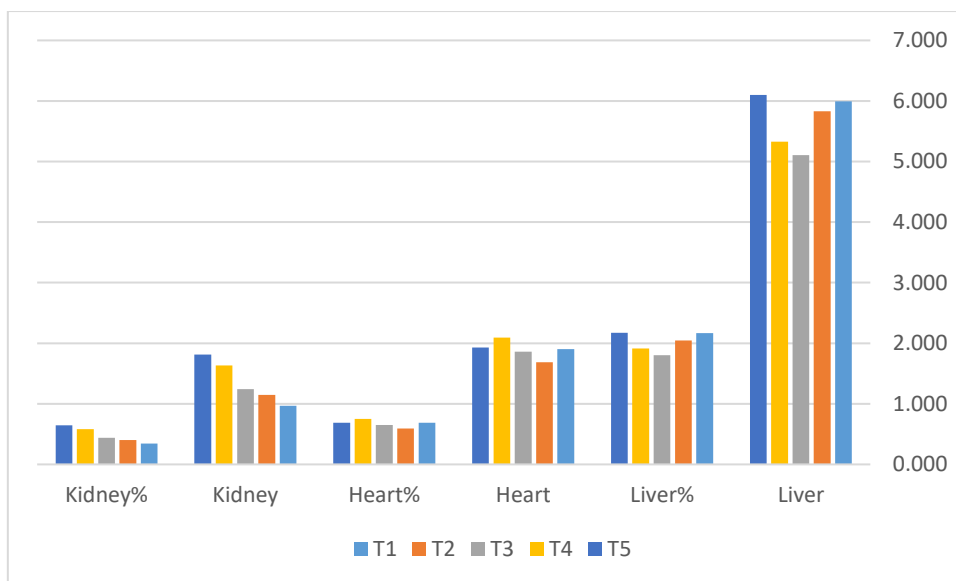


**Figure 2** The weight of the spleen, weight of the gizzard, and pancreas in the different treatments.

Table (3) and Figure (3) show the weight of the liver, heart, and kidney in the chickens. The results showed that there were significant differences between the different treatments compared to the control group, where pp 200mg/kg recorded a significant difference in the weight of the liver, which recorded 6.102a, while the control group recorded 5,993a. This is consistent with studies in rats that the polypropylene-derived extract of potato peel significantly improves liver function induced by carbon tetrachloride. [14] the binding of bile acids is thought to be one mechanism by which certain sources of dietary fiber act to reduce cholesterol in the liver. [15] found that after four weeks of feeding on potato peels, mice showed a 40% reduction in plasma cholesterol content and a 30% reduction in cholesterol levels in hepatic fat compared to animals that were fed only a supplemented diet. The treatment fed with pp 100mg/kg recorded a slight significant difference at the heart level compared to the other treatments at the level  $p < 0.05$  2.095a, where the highest significant difference was recorded compared to the control group and the other treatments, while the treatment fed with pp 200mg/kg recorded a significant difference at the kidney level, where the highest significant difference was recorded at 1.811a compared to the control group, which recorded the lowest significant difference at 0.965b, and this is consistent with what was said by [14] in that study, diabetic mice fed a diet supplemented with potato peel powder for 4 weeks showed a significant reduction in blood glucose levels. In addition to significantly reducing kidney enlargement in diabetics. Improving kidney functions. [16] revealed that infected rats fed a diet supplemented with 20% potato peel powder showed the highest significant improvement in lipid profile, liver function, kidney function, blood profile, and plasma glucose compared to the control group.

**Table 3** The weight of the liver, the heart, and the kidney in the treatments.

Treatments	Liver	Liver%	Heart	Heart%	Kidney	Kidney%
Control	5,993a	2,167a	1,902ab	0,685ab	0,965b	0,346b
Vit.C 200mg/ kg	5,830a	2,045a	1,689b	0,594b	1,145ab	0,403ab
pp50mg/ kg	5,109a	1,803a	1,859ab	0,652ab	1,243ab	0,437ab
pp100mg/ kg	5,330a	1,913a	2,095a	0,750a	1,632ab	0,583ab
pp200mg/ kg	6,102a	2,175a	1,928ab	0,685ab	1,811a	0,646a

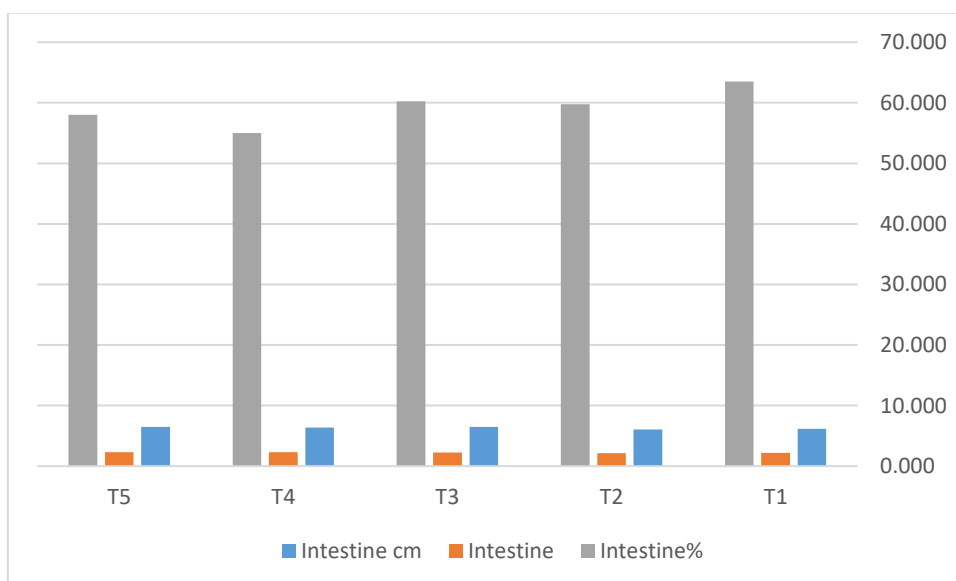


**Figure 3** The weight of the liver, the heart, and the kidney in the treatments.

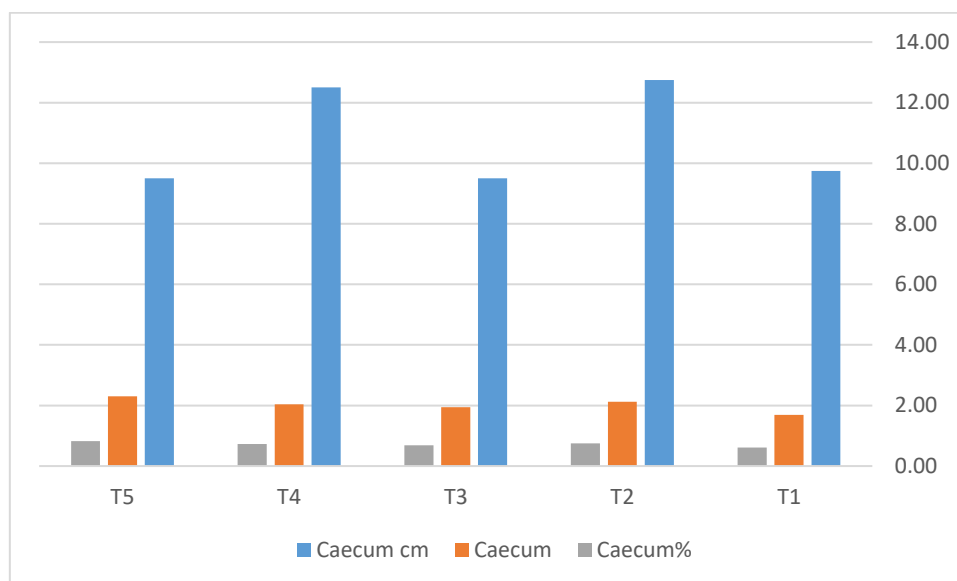
Table (4), Figure (4), and Figure (5) show the weight and length of the intestine, as well as the weight and length of the caecum in centimeters. The results showed that there are no significant differences between the different treatments compared to the control group, as it is noted that there is a significant numerical difference in the length of the intestine, as the control group recorded the highest value of 63.50a, while the length of the caecum recorded the highest significant difference for the treatment given Vit. C 200mg/kg because ascorbic acid is synthesized in the kidneys and therefore the bird does not need it to improve its functions, according to the Norwegian Council [17]. It may be recommended in poultry feed as supplements to relieve stress, assuming that during stress the requirements may exceed the ability to Synthesis [18].

**Table 4** The weight and length of the intestine, and the caecum in centimeters in different treatments.

Treatments	Intestine mg	Intestine%	Intestine cm	Caecum cm	Caecum mg	Caecum%
Control	6,169a	2,223a	63,50a	9,75a	1,689a	0,607a
Vit. C 200mg/ kg	6,080a	2,139a	59,75a	12,75a	2,123a	0,746a
pp50mg/ kg	6,456a	2,259a	60,25a	9,50a	1,945a	0,683a
pp100mg/ kg	6,395a	2,290a	55,00a	12,50a	2,042a	0,732a
pp200mg/ kg	6,475a	2,281a	58,00a	9,50a	2,308a	0,822a



**Figure 4** The weight and length of the intestine are in centimeters in different treatments.



**Figure 5** The weight and length of the cecum in centimeters in different treatments.

### Conclusion

Although there are differences in the weights of the internal organs of chickens, extra reports, and additional surveys are required from various poultry species. These will offer extra data and further information, and probably facilitate an explanation of adding potato peel to poultry feed.

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