Alnakhla
Journal of Science (AJOS)
www.alnakhlajos.com
Print ISSN: 3007 – 0198
Online ISSN: 3007 – 0201

Impact of clipping tip of tongue on body weight of Pekin duck with short beak and dwarfism syndrome (SBDS)

Makram, A.[1]*, A.H.El- Attar[2], A. Zein El-Dien[2] and M. Abdel-Tawab[2]
[1]Poultry Production Department, Faculty of Agriculture, Fayoum University, Egypt and [2]Poultry Production Department, Faculty of Agriculture, Ain Shams University, Egypt.

***Correspondence: :**
Am150@Fayoum.edu.eg
Received: May 1st 2024
Accepted: May 14th 2024
Published: May 15th 2024

ABSTRACT

The short beak and dwarfism syndrome (SBDS) is one of the most important problems widespread in ducks, especially Pekin ducks in Egypt, which causes dwarfism in the body and the tongue sticking out of the beak. It begins to appear from 18 days until 25 days of age. Morbidity ranges from 10-25%, but in this study increased to 42% of Pekin and 6% of Domyati ducks. This study aims to compare normal ducks without (SBDS) and ducks with (SBDS) after clipping the tip of the tongue on body weight, body weight gain, and growth rate. A total number of 200, one day old Pekin ducks that were raised 8 weeks of age, were divided into three experimental groups; the first group (G1) normal ducks without (SBDS, the second (G2) was with (SBDS) after clipped the tip of the tongue, the third group (G3) was with (SBDS) without clipped the tip of tongue. Also, 150, one day old Domyati were raised until 8 weeks to study the morbidity of SBDS in local strain. The live body weight was recorded, body weight gain, growth rate, and relative body weight of duck with (SBDS) to normal duck were calculated, and mortality. The live body weight was 3391, 2729, and 946 g of The G1, G2, and G3 respectively. However, the mortality ratio was higher from 1 day old to 3 weeks, which reached 13.4%. The G3 when kept for 10 weeks, the live body weight decreased and mortality was higher because the tongue stuck more out of the beak. In conclusion, clipping the tip of the tongue on a duck with (SBDS) increased the marketing of live body weight.

Keywords: Short beak, SBDS, Derzsy's disease, Goose parvovirus, Muscovy duck, Pekin duck, Domyati duck.

Introduction

Ducks rearing is spread in Egypt on a large scale, whether commercially or in the rural sector, there are many types of commercial and local strains of Muscovy, such as the French Muscovy duck (commercial), or Sudani and Fayoumi ducks (local strains), also Mallard strains, such as the Pekin and Khaki Campbell ducks (commercial), Domyati and Shershery ducks (local Mallard) (Galal *et al.,* 2011: Makram 2015 and 2016: Makram *et al.,* 2021). The phenomenon of dwarfism and atrophy of the beak and growth of the tongue outside the beak is known as the Short beak and dwarfism syndrome (SBDS). The SBDS was observed in Egypt beginning in 2012 on Pekin duck, but it increased from the beginning of 2015 (Soliman *et al.,* 2020). The shortening of the beak is suggested as a consequence of the virus's effect on beak morphogenesis (Palya *et al*., 2009). The beak is made up of multiple facial prominences. During development, the sperm in encesare proportionally coordinated to compose a unique beak. There are two proliferative zones in the front on the mass of beak in ducks. These growth zones are associated with bone morphogenetic protein

activity (Wu *et al*., 2004) that might be affected during parvovirus infection, which in turn can result in the duration of the beak shape. The Mechanism of parvovirus infection and its effect on these cells, however, needs further investigation (Makram, 2015). Much research suggested that the SBDS caused y to viruses, is novel goose parvovirus (nGPV) and duck circovirus (DuCV), however, another study in China on SBDS-infected Pekin ducks showed that among the birds positive for nGPV 72.48% were co-infected with DuCV. Therefore, the authors suggested that co-infection of nGPV and DuCV can be important for the development of clinical signs of SBDS (Li *et al.,* 2018). The SBDS causes major economic losses because it affects the marketing weight and may cause mortality at large age stages (Matczuk *et al.,* 2020). This study aims to reduce the losses resulting from SBDS-infected body weight and also study the morbidity of Domyati duck (Local strains).

Materials and Methods

This experiment was carried out at a poultry farm of Fayoum University, during the period from November 2023 to January 2024. 200 and 150 one day old of Pekin and Domyati ducks they were reared under the same environmental, managerial, and hygienic conditions from one day old to 8 weeks of age (Figure 1). The feed and water were supplied *ad libitum.* They were fed a diet containing 23 % protein and 3000 K/Cal (0-3 wk), 21% P and 3100 K/Cal (3 – 5 wk), and 18 % P and 3200 K/Cal (5-8wk). The herd was exposed to the short beak and dwarfism syndrome (SBDS), which appeared at the age of 18-25 days on both strains. The number of ducks with SBDS of Pekin ducks after mortality was 66 birds, the number of normal ducks was 91 ducks, while the number of birds with SBDS of Domyati ducks was 7 birds, and the number of healthy ducks was 112 ducks. The Pekin Duck was divided into three groups, the First group (G1), normal ducks without SBDS infection (91 birds), the Second group (G2) birds with SBDS infection, in this group, the tip of the tongue was cut off, and cauterized to stop the bleeding (33 birds), third groups (G3), in this groups, the bird's infection with SBDS without cut the tip of the tongue (Figure 2). The live body weight of Domyati ducks are presented in Table (1).

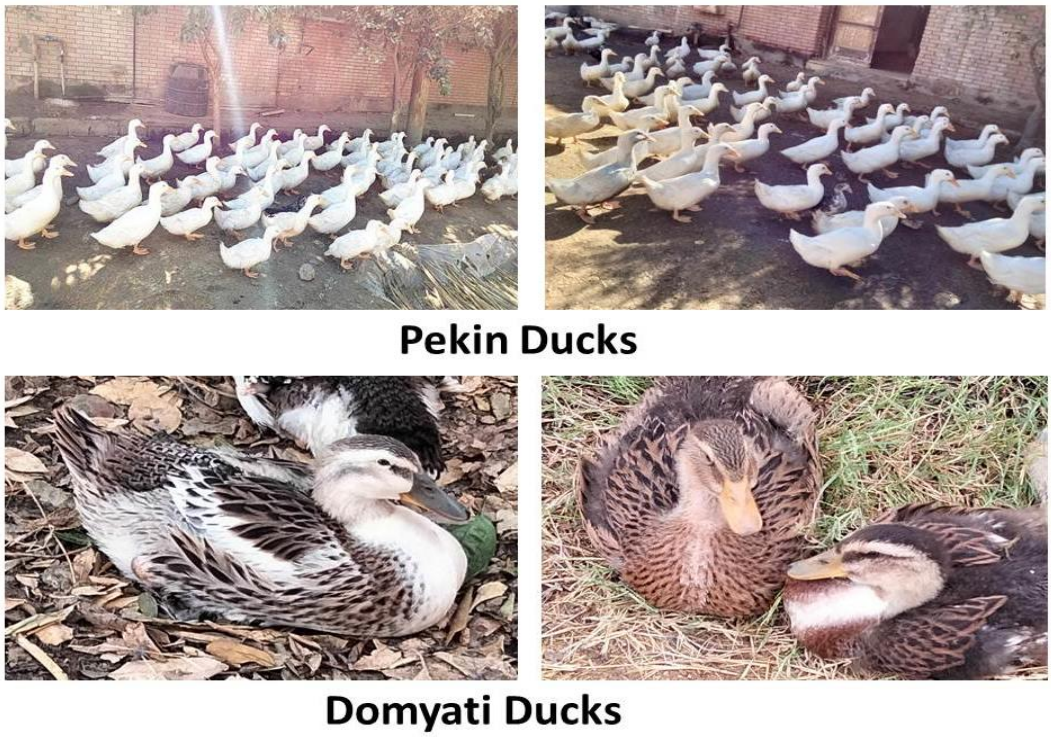

Figure (1): Photos show the Pekin and Domyati ducks.

Figure (2): Photos show the cutting tip of the tongue of Pekin Ducks

Table (1): Live body weight for the Domyati duck from 1 day to 8 weeks of age

Age (Weeks)	Maximum	Minimum	Average
0	29	59	39.7
1	95	197	138.5
2	275	600	400.5
3	955	500	808.50
4	1390	650	1203.7
5	1490	850	1379
6	1900	1050	1581.8
7	2100	1390	1693
8	2650	1350	1836

Measurements:

Body weight and body weight gain: Body weights were recorded according to 8 weeks of Pekin duck in each group. Body weight gain was calculated for different periods

Growth rate: The growth rate was calculated as the following equation (Broody, 1945):

$$\text{Growth rate (GR)} = \frac{W2 - W1}{0.5\,(W2 + W1)} \times 100$$

Where: W1 = initial weight, W2 = second weight.

Relative weight: The live body weight for groups with SBDS infection to normal ducks of the same age

$$\text{Body Weight\% (SBDS infection)} = \frac{W_{SBDS}}{W_{\text{Normal duck}}} \times 100$$

Where: W1 = initial weight, W2 = second weight.

Mortality and defect: Mortality was recorded during the experimental period, while the observed defects in (legs, dwarf, beak, neck …etc.) were recorded for the birds that didn't die

Statistical analyses: Data concerned with body weight, body weight gain, and growth rate until 8

weeks of age, using the General Linear Model (GLM) procedure of SAS (2004). According to the following model (I);

$Y_{ij}= \mu + S_i + e_{ij}$

Where; Y_{ij}= Trait measured, μ = Overall means, T_i = Treatment effect, e_{ij} = Experimental error.

Results and Discussion

Growth performance: Body weight, body weight gain, and growth rate of Pekin duck as affected by infection of SBDS are presented in Table (2) and Figure (3). Ducks group without infection (G1) had significantly heavier live body weight at 4,5,6,7 and 8 wks of age compared to the group with SBDS and not cutting the tip of the tongue (G3) or ducks group with SBDS and cutting the tip of the tongue (G2). The G2 ducks had higher significant body weight compared to the G3 ducks. The same trend was noticed for boy weight gain.

For growth rate, the G1 ducks were significantly higher growth rates from 4-5, 7-8, and from 4-8wks as follows .37%, 112%, and 83%, for G2 ducks, 31%, 51% and75% for G3 ducks, 1.6%, 43%, and 42%, however no significant different among groups from 5-6 and 7-8 wks of age. The tongue sticking out of the beak makes it difficult to feed and thus reduces weight. Also, not clipping the tongue makes it continue to grow outside the beak, which exposes it to wounds and tumors, which cause the ducks to become hungry and lose weight (Figure 4).

Matczuk *et al.,* (2020) reported the first record of nGPV cases in Pekin duck flocks in Poland, which was responsible for the SBDS outbreak. Morbidity ranged between 15% and 40%, while the mortality rate was 4–6%. Co-infection with DuCV was detected in six out of eight flocks. Also, Soliman *et al.,* (2020) investigated that, Derzsy's disease causes disastrous losses in domestic waterfowl farms. A genetically variant strain of Muscovy duck parvovirus (MDPV) and goose parvovirus (GPV) was named novel goose parvovirus (NGPV), which causes characteristic syndrome in young ducklings. The syndrome was clinically characterized by deformity in beaks and retarded growth, called short beaks and dwarfism syndrome (SBDS). The common clinical signs were growth retardation and watery diarrhea; then, within a few days, drastic mortalities took place (Jansson *et al.,* 2007 and Wozniakowski *et al.,* 2012). This infection of SBDS can cause 20% to 50% morbidity. Although the mortality rate of short beak and dwarfism syndrome (SBDS), (a synonym of BADS) is very low, the severe weight loss caused by stunting has caused serious economic losses to the Chinese waterfowl industry. The pathogen was found to be a variant strain of GPV–NGPV also referred to in some research as short beak and dwarfism syndrome virus (SBDSV) (Li et al., 2016 Chen *et al.,* 2021).

Table (2): Effect of clipping tip of the tongue on body weight, body weight gain, and growth rate of Pekin duck

Age (Week)	Raising system			
	G1	G2	G3	Level of Significant
Body Weight (g)				
4	1427.3^{a}±13.0	1270.2^{b}±25.2	690.4^{c}±43.9	0.0001
5	2133.0^{a} ±80.0	1776.1^{b} ±76.8	702.4^{c} ±45.8	0.0001
6	2559.5^{a} ±42.2	2060.5^{b} ±60.5	819.7^{c} ±64.1	0.0001
7	2733^{a} ±38.2	2439.5^{b} ±54.0	921.9^{c} ±75.3	0.0001
8	3391.1^{a} ±81.1	2729.0^{b} ±28.4	946.5^{c} ±91,9	0.0001
Body Weight Gain (g)				
4-5	705.7^{a} ±69.8	505.9^{b} ±54.3	6.4^{c} ±3.6	0.0001
5-6	426.5^{a} ±42.9	386.8^{a} ±35.2	199.0^{b} ±46.2	0.003
6-7	190.1^{a} ±12.6	379.0^{b} ±23.7	102.2^{c} ±16.2	0.0001
7-8	726.8^{a} ±50.6	289.5^{b} ±34.1	73.2^{c} ±47.1	0.0001
4-8	1998.04^{a} ±72.4	1481.3^{b} ±17.5	344.2^{c} ±74.9	0.0001
Growth Rate (%)				
4-5	36.8^{a} ±3.2	31.3^{a} ±2.7	1.6^{b} ±0.8	0.0001
5-6	20.3±2.4	21.8±2.7	26.8±4.6	NS
6-7	7.4^{c} ±0.53	17.1^{a} ±1.2	11.1^{b} ±1.6	0.0001
7-8	112.6^{a} ±6.6	51.2^{b} ±6.4	42.8^{b} ±26.6	0.0005
4-8	82.8^{a} ±1.5	74.8^{b} ±1.4	42.3^{b} ±5.9	0.0001

$^{a, b, and c}$ Means within the same row with different letters significantly differed

G1= Normal ducks without SBDS, G2= Ducks with SBDS after clipping the tip of the tongue, G3= Ducks with SBDS without clipping the tip of the tongue, Live body weight was 61.2, 229.3, 592, and 851 g at 1 day, 1, 2, and 3 wks of age, respectively.

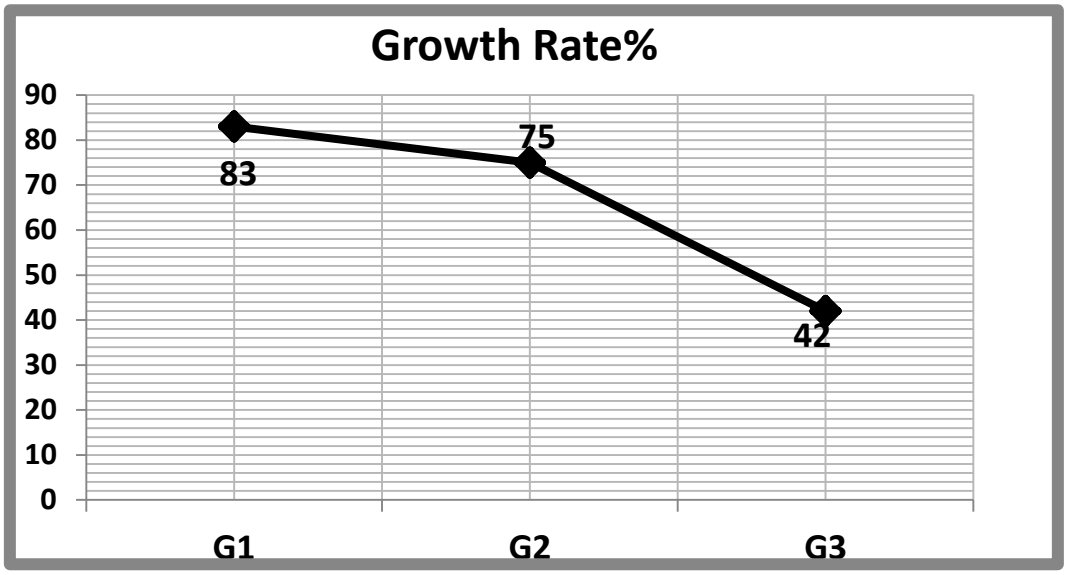

Figure (3): Growth rate from 4-8 weeks of age among normal and infected ducks. G1= Normal ducks without SBDS G2= Ducks with SBDS after clipping the tip of the tongue. G3= Ducks with SBDS without clipping the tip of the tongue

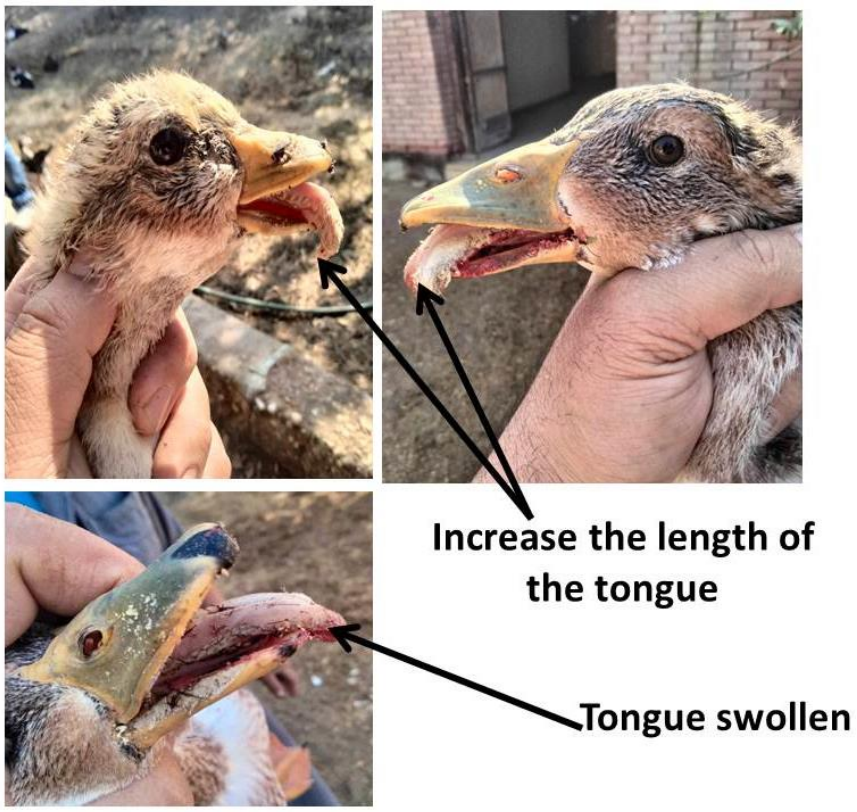

Figure (4): Photos shows the length of the tongue growing out of the beak and being exposed to wounds and tumors

Relative Body Weight: Data in Table (3) shows the relative body weight of ducks groups with SBDS (G2 and G3) to normal ducks (G1). The relative body weight for G2 ducks from 4-8 weeks of age was significantly higher 92%, 96%, 87% 94%, and 86% compared to G3 ducks, 48%, 36%, 35%, 35%, and 29%. The tongue clipping process helped the second group to eat the feed easily, which led to an increase in body weight and a weight approaching that of normal ducks. Previous research has agreed that the problem of SBDS resulting from a Goose parvovirus or Muscovy duck parvovirus causes problems in the growth of the beak and tongue, that this problem causes significant mortality, also causes stunting in the body, slow growth, major economic loss as a result of low weight and high mortality(Glávits *et al.,* 2005; Matczuk *et al.,* 2020; Soliman *et al.,* 2020; Wang *et al.,* 2022).

Table (3): Effect of the clipping tip of the tongue on relative body weight (%) of Pekin ducks

Age (Week)	G2	G3	Level of Significant
4	91.8±1.3	48.1±2.6	0.0001
5	96.3±2.4	36.8±1.4	0.0001
6	87.3±1.5	34.6±2.2	0.0001
7	94.4±0.86	35.5±2.5	0.0001
8	86.0±1.7	29.5±2.3	0.0001

[a and b] Means within the same row with different letters have significantly differed

G2= Ducks with SBDS after clipping the tip of the tongue

G3= Ducks with SBDS without clipping the tip of the tongue

Mortality and Morbidity: Mortality and morbidity affected by infection of SBDS of Pekin and Domyati ducks are presented in Table (4). The number of mortality from 0-21 days was 31 ducks (20%) and 43 ducks (21.5%) of Domyati and Pekin ducks, respectively. The morbidity of SBDS from a total number (of 150) was 4.6% and from live birds, 5.8% of Domyati ducks, concerning Pekin ducks, the morbidity from a total number (of 200) was 33%, and from live birds 42%. The mortality increased on G3 ducks from 18 days until the end of the experiment, with mortality number 12 (36.36%) ducks from a total number of 33 birds. However, the mortality from G2 ducks was 3 (9%) ducks from a total number of 33 birds and 5 (5.5%) ducks from a total number of 91 birds of G1 ducks. From the previous data, it is clear to us that there is an impact of strain on the morbidity and mortality of the SBDS, Domyati ducks are more resistant than the Pekin duck.

Both Goose parvovirus (GPV) and Muscovy duck parvovirus (MDPV) usually show 70–100% morbidity and mortality during the first 3 to 4 weeks of age (Glávits *et al.,* 2005 and Jansson *et al.,* 2007). SBDS is a contagious disease of ducks, characterized by growth retardation, short beak, tongue protrusion, lameness, unwillingness to move, and diarrhea (Palya *et al.,* 2009 Wang *et al.,* 2022). The morbidity of SBDS is 10%~30% and the mortality is less than 5% (Chen *et al.,* 2015). Another study by Matczuk *et al.,* (2020) confirmed the first record of novel goose parvovirus (nGPV) cases in Pekin duck flocks in Poland, which was responsible for the SBDS outbreak. Morbidity ranged between 15% and 40%, while the mortality rate was 4–6%.

Qassim et al., (2022) found that giving a low dose of energy drink leads to mild to moderate renal damage, whereas, high doses result in severe damage. Moreover, in humans, cases of kidney injuries were reported following the consumption of these drinks . Thus it is indicated that energy drinks are nephrotoxic on chronic consumption and their toxicity is dose-dependent.

Conclusions

The SBDS is a major problem that causes economic losses due to mortality and decreased body weight. However, the problem of body weight can be solved through early clipping of the tongue when it is outside the beak. This treatment leads to an increase in body weight and reduces the harm of the SBDS.

Table (4): Mortality and morbidity for SBDS of Pekin and Domyati ducks strain.

Age (Week)		Mortality		Morbidity From Total Number		Morbidity from Live Birds	
		Pekin	Domyati	Pekin	Domyati	Pekin	Domyati
Ducks Number		200	150	200	150	157	119
0-3 wks	N	43	31	0	0	0	0
	%	21.5	20.6	0	0	0	0
3-8 wks	N	20	6	66	7	66	7
	%	1	4	33	4.6	42	5.8
Mortality among groups of Pekin ducks							
Ducks Number	G1	G2	G3	Ducks Number	G1	G2	G3
	91	33	33		91	33	33
Mortality	3	5	12	Mortality%	3.3	15.15	36.4

G1= Normal ducks without SBDS, G2= Ducks with SBDS after clipping the tip of the tongue, G3= Ducks with SBDS without clipping the tip of the tongue.

References

Brody, S., (1945). Bioenergetics and Growth. New York: Reinhold Publishing Co.

Chen, H, Dou Y, Tang Y, (2015). Isolation and genomic characterization Of a Duck-Origin GPV-related parvovirus from Cherry Valley Ducklings in China. PLoS One. 2015;10(10):e0140284. DOI:10.1371/journal. pone.0140284.

Chen, Y, Afumba R, Pang F, Yuan R, Dong H, (2021). Advances in research on genetic relationships of waterfowl parvoviruses. J Vet Res 65, 391-399 DOI:10.2478/jvetres-2021-0063.

Galal, A., W.A.H. Ali, A.M.H. Ahmed, and Kh. A.A. Ali (2011). Performance and carcass characteristics of Domyati, Muscovy, Peking, and Sudani duck breed. Egypt. J. Anim. 48(2):191-202.

Glávits, R.; Zolnai, A.; Szabó, E.; Ivanics, E.; Zarka, P.; Mató, T.; Palya, V. (2005). Comparative pathological studies on domestic geese (Anseranser domestica) and Muscovy ducks (Cairina moschata) experimentally infected with parvovirus strains of goose and Muscovy duck origin. Acta. Vet. Hung, 53, 73–89.

Jansson, D.S.; Feinstein, R.; Kardi, V.; Mató, T.; Palya, V. (2007). Epidemiologic investigation of an outbreak of goose parvovirus infection in Sweden. Avian Dis. 51, 609–613.

Li, C., Li Q., Chen Z., Liu G. (2016). Novel duck parvovirus identified in Cherry Valley ducks (*Anas platyrhynchos domesticus*), China. Infect Genet Evol,44, 278–280, doi: 10.1016/j.meegid. 2016.07.020

Li, P.; Li, J.; Zhang, R.; Chen, J.; Wang, W.; Lan, J.; Xie, Z.; Jiang, S. (2018). Duck "beak atrophy and dwarfism syndrome" disease complex: Interplay of novel goose parvovirus-related virus and duck circovirus? Transbound. Emerg. Dis. 65, 345–351.

Makram, A. (2015). Improving the productive performance of native duck breeds by crossing with standard commercial duck breeds. PhD. Thesis, Faculty. Agriculture., Ain Shams University, Cairo, Egypt.

Makram, A. (2016). Ducks World (Review Article). The 9th International Poultry Conference (Oral Presentation) from 7-10 November.463-486.

Makram, A., I. El-Wardany, A. Zein El-Dien, A.H.EL-Attar and A.S. Abdel-Azeem. (2021). Effect of feather color on productive performance, carcass traits and ileum histology of Mule ducks under free range system. Animal Science Papers and Reports vol. 39 no. 3, Institute of Genetics and Animal Biotechnology of the Polish Academy of Sciences, Jastrzębiec, Poland

Palya V, Zolnai A, Benyeda Z, (2009). Short beak and dwarfism syndrome of mule duck is caused by a distinct lineage of goose parvovirus. Avian Pathol.;38(2):175–180. DOI:10.1080/03079450902737839

SAS Institute, (2001). SAS/STAT User's Guide Version 8.2 ed., Statistics. SAS Institute Inc., Cary, NC.

Soliman, M.A., Erfan , A.M., Samy, M., Mahana, M and Soad A. Nasef, S.A. (2020). Detection of Novel Goose Parvovirus Disease Associated with Short Beak and Dwarfism Syndrome in Commercial Ducks. Animals, 10, 1833; doi:10.3390/ani10101833.

Wang, J., Wang, Y.,, Li, Y., Gao, Y., Li, Y., Jiang, Z., Zhu, G., and Wang, X. (2022). Reproduction and pathogenesis of short beak and dwarfish syndrome in Cherry Valley Pekin ducks infected with the rescued novel goose parvovirus.

Virulence, 13:1, 844-858, DOI: 10.1080/21505594.2022.2071184

Wozniakowski, G.; Samorek-Salamonowicz, E.; Kozdru´ n,W. (2012). Quantitative analysis of waterfowl parvoviruses in geese and Muscovy ducks by real-time polymerase chain reaction: Correlation between age, clinical symptoms and DNA copy number of waterfowl parvoviruses. BMC Vet. Res. 8, 1–10.

Wu, P., T. X. Jiang, S. Suksaweang, R. B. Widelitz, and C. M. Chuong (2004). Molecular shaping of the Beak. Science, 305, 1465-1466.