



Changes in the physical properties of the meat of broiler carcasses using *aloe vera* oil extracted locally compared to the imported

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Abstract

This study was conducted to demonstrate the changes in the physical properties of broiler carcasses by locally extracted *aloe vera* oil compared to the imported, from 3/5/2022 to 5/6/2022. 270 unsexed Ross 308 broiler chicks, one day old, with 4 treatments were. T1 (control treatment), the locally extracted aloe vera oil treatments were T2 and T3 (water bath), T4 and T5 (oil immersion). The treatments of imported *aloe vera* oil were T6 and T7 (Pakistani origin), T8 and T9 (Iranian origin). Addition levels were 0.30 and 0.40 ml oil/kg deit. The physical characteristics of the studied broiler carcasses meat were Water Holding Capacity (WHC), Thawing loss, Drip loss and Cooking loss. A significant improvement ($P \leq 0.05$) for treatments of *aloe vera* oil extracted locally, especially extracted by the water bath method, in the physical characteristics of the meat of broiler carcasses, represented by each of the water holding capacity, the effluent liquid and the loss when melting and cooking, compared with imported aloe vera oil and control treatment. T3 treatment was the best on other locally extracted *aloe vera* oil treatments.

Keywords: physical properties, meat, broiler carcasses, *aloe vera oil*, extracted locally, imported.

Introduction

Recently, medicinal plants and their extracts have been widely used as an alternative to antibiotics, plays a major role in supporting the immune system, it contains many active compounds (Al-Gharawi *et al.*, 2014; Al-Gharawi *et al.*, 2023). The excessive use of antibiotics leads to negative effects, whether

on human or animal health, as well as the emergence of some bacterial strains that are resistant to some antibiotics (Vaou *et al.*, 2022).

Therefore, specialists were interested in studying medicinal plants as a safe and vital alternative to antibiotics, due to the effect of effective compounds that stimulate digestion

and absorption, as well as its vital role as an antioxidant (Akintayo–Balogun and Alagbe, 2020). As these effective compounds, despite their low concentrations in plants or in their extracts, its curative and preventive effects are very large, one plant contains more than one active compound, which has a contributing role in supporting the body's immune system (Al–Yasiri, 2011).

One of these medicinal plants is *aloe vera*, which has a high ability to inhibit and prevent the growth of microorganisms such as bacteria, fungi and viruses, pathogens as well as inhibit the growth of food putrefactive organisms (Kedarnath *et al.*, 2013). Misir *et al.* (2014) showed that *aloe vera* gel is the best coating for covering foodstuffs and increasing the shelf life of foodstuffs and not spoiling them, as a result of aloe vera gel containing polysaccharides, which are a natural barrier to moisture and oxygen that cause food damage.

Therefore, this study aims to demonstrate the changes in the physical properties of broiler carcasses using locally extracted aloe vera oil compared to the imported.

Materials and Methods:

This study was conducted to demonstrate the changes in the physical properties of broiler carcasses by locally extracted aloe vera oil compared to the imported, from 3/5/2022 to 5/6/2022. 270 unsexed Ross 308 hybrid broiler chicks, one day old, weighing 40.0 gm, were distributed randomly to nine

experimental treatments, with 30 chicks per treatment, 3 replicates of the treatment (10 chicks/ replicate). T1 transactions were the control treatment, the locally extracted aloe vera oil treatments were T2 and T3 (water bath), T4 and T5 (oil immersion). The treatments of imported aloe vera oil were T6 and T7 (Pakistani origin), T8 and T9 (Iranian origin). Addition levels were 0.30 and 0.40 ml oil/kg diet.

The physical characteristics of the studied broiler carcasses meat were Water Holding Capacity (WHC), Thawing loss, Drip loss and Cooking loss.

Results and discussion

Table (1) shows impact of using extract local and imported *aloe vera* oil on the Water Holding Capacity for the breast, thigh and drumstick of broiler carcasses, it shows a significant increase ($P \leq 0.05$) in T3 compared to T4 and T5, which showed a significant superiority on T6, turn was significantly superior ($P \leq 0.05$) on T8 and T9, then on T1, there were no significant differences between T2, T3 and treatments T2, T4 and T5 and treatments T4, T5 and T7 and treatments T6 and T7 and treatments T8 and T9. As for the ability to loss water for the meat of both the thigh and the femoral–ankle joint of broiler chickens, T3 showed a significant superiority over the T2, which was significantly superior ($P \leq 0.05$) compared to the T5, which significantly excelled ($P \leq 0.05$) with the significantly superior T4 at the expense of

the significantly superior T7 ($P \leq 0.05$) compared to the significantly superior T6 treatment ($P \leq 0.05$) at the expense of the T9 treatment, then the T8 treatment which significantly excelled ($P \leq 0.05$) at the expense of control treatment. the average WHC of breast meat were 33.35, 37.03,

37.26, 36.54, 36.68, 35.90, 36.16, 34.52 and 34.90. For thigh were 30.07, 32.66, 32.95, 32.19, 32.40, 31.38, 31.38, 31.65, 30.66 and 31.07. At drumstick 32.05, 33.80, 33.97, 33.44, 33.66, 32.88, 33.02, 32.37 and 32.54 for treatments T1, T2, T3, T4, T5, T6, T7, T8 and T9 respectively.

Table (1) Impact of using *aloe vera* oil local extracted and imported on the WHC (%) for breast, thigh and drumstick of broiler carcass \pm standard error.

Treatments	Breast	Thigh	Drumstick
T1	30.44 \pm 33.35	30.07 \pm 0.11	32.05 \pm 0.06
T2	37.04 \pm 37.03	32.66 \pm 0.05	33.80 \pm 0.02
T3	37.26 \pm 0.03	32.95 \pm 0.03	33.97 \pm 0.04
T4	36.54 \pm 0.04	32.19 \pm 0.02	33.44 \pm 0.04
T5	36.68 \pm 0.01	32.40 \pm 0.02	33.66 \pm 0.04
T6	35.90 \pm 0.13	31.38 \pm 0.04	32.88 \pm 0.04
T7	36.16 \pm 0.10	31.65 \pm 0.03	33.02 \pm 0.02
T8	34.52 \pm 0.13	30.66 \pm 0.05	32.37 \pm 0.04
T9	34.90 \pm 0.10	31.07 \pm 0.06	32.54 \pm 0.04
Sig.	*	*	*

Table (2) indicates the effect of using *aloe vera* oil extracted locally and imported on the thawing loss of the breast, thigh and drumstick of broiler carcasses. It was observed that there was a significant decrease in T3 compared to T2, significantly

decreased ($P \leq 0.05$) compared to T5, then T4, then T7, then T6, then T9, then T8 treatment, and then to control. As for the Thawing loss of the meat, each of the thigh and drumstick of the broiler carcasses, T3 treatment showed a significant decrease

($P \leq 0.05$) compared to the T2 treatment, then T5 treatment, then T4 treatment, then T7 treatment, then T8 and T9 treatment, and then compared to control. There were no significant differences between T8 and T9 for each of thigh and drumstick. The mean Thawing loss of breast meat were 5.05,

3.81, 3.64, 4.15, 4.02, 4.47, 4.38, 4.78 and 4.62. Thigh meat were 3.62, 2.61, 2.48, 2.98, 2.89, 3.17, 3.08, 3.41 and 3.39. The drumstick meat were 3.28, 2.58, 2.47, 2.83, 2.67, 2.99, 2.93, 3.12 and 3.04, respectively.

Table (2) Impact of using aloe vera oil local extracted and imported on the thawing loss (%) for breast, thigh and drumstick of broiler carcass \pm standard error.

Treatments	Breast	Thigh	Drumstick
T1	5.04 \pm 33.35	30.07 \pm 0.11	32.05 \pm 0.06
T2	3.04 \pm 37.03	32.66 \pm 0.05	33.80 \pm 0.02
T3	3.26 \pm 0.03	32.95 \pm 0.03	33.97 \pm 0.04
T4	3.54 \pm 0.04	32.19 \pm 0.02	33.44 \pm 0.04
T5	3.68 \pm 0.01	32.40 \pm 0.02	33.66 \pm 0.04
T6	3.13 \pm 35.90	31.38 \pm 0.04	32.88 \pm 0.04
T7	3.16 \pm 0.10	31.65 \pm 0.03	33.02 \pm 0.02
T8	3.52 \pm 0.13	30.66 \pm 0.05	32.37 \pm 0.04
T9	3.90 \pm 0.10	31.07 \pm 0.06	32.54 \pm 0.04
Sig.	*	*	*

All treatments of *aloe vera* oil showed significant improvement on water-holding capacity (WHC) and thawing loss, especially the *aloe vera* oil extracted locally, the most important of which was the *aloe vera* oil extracted using the water bath method, this

may be due to the fact that *aloe vera* oil contains many effective compounds, the most important of which are aloin and emodin, which increases the ability of the muscle to retain water by the space between the myofibrils, that increase water retention within the muscle (Fanatico *et al.*, 2005). Or, these compounds may work to increase the ability

of the meat to hold and retain the bound water that is inside the muscle cell that forms these tissues, and retain water increases due to its low solubility (Al-Rubaie *et al.*, 2008; Park *et al.*, 2021; Poursalehi *et al.*, 2021).

The reason for the decrease on the thawing loss in relation to locally extracted aloe vera oil treatments may be that it contains effective compounds, including aloin and emodin, as well as phenolic and flavonoid compounds, which works to maintain the stability of the cell balance of the meat, reduces the loss of cell-forming fluids, in addition to reducing the damage caused by the oxidation process, and thus ensuring the integrity of the membranes from damage, leads to rupture of cell membranes, results in the loss of cellular components, then the drop of the thawing loss, with an increase in the ability of the meat to hold and bind to water (Zapata and Pava, 2017; Park *et al.*, 2021).

Table (3) shows impacte of using aloe vera oil local extracted and imporited on the drip

loss of the breast, thigh and drumsticks of broiler carcasses., as it was noted in the drip loss in the meat of each of the breast and thigh a significant decrease ($P \leq 0.05$) for T3 compared to T5, then T4 treatment, then T7 treatment, then T6 treatment, then T9 treatment, then the T8 treatment showed a significant decrease ($P \leq 0.05$) compared to the control. It was also observed in the drip loss of drumstick meat, a significant decrease ($P \leq 0.05$) for T3 treatment, then T2 treatment, then T5 treatment, then T4 treatment, then T6 and T7 treatments, then T9 treatment, then T8 treatment, which decreased significantly ($P \leq 0.05$) compared to the control treatment, there were no significant differences between T6 and T7 treatments. The average drip loss of breast meat were 5.03, 4.16, 4.01, 4.48, 4.35, 4.75, 4.64, 4.96 and 4.88. At thigh meat 3.97, 3.23, 3.11, 3.39, 3.31, 3.63, 3.56, 3.82 and 3.74. At drumstick meat were 3.62, 2.92, 2.70, 3.11, 3.02, 3.28, 3.22, 3.41 and 3.35, for treatments respectively.

Table (3) Impact of using aloe vera oil local extracted and imported on the drip loss (%) for breast, thigh and drumstick of broiler carcass \pm standard error.

Treatments	Breast	Thigh	Drumstick
T1	5.03a0.01 \pm	3.97a0.02 \pm	3.62a0.02 \pm
T2	4.16h0.03 \pm	3.23h0.008 \pm	2.92g0.02 \pm
T3	4.01i0.01 \pm	3.11i0.02 \pm	2.70h0.03 \pm

T4	4.48f0.01 ±	3.39f0.02 ±	3.11e0.01 ±
T5	4.35g0.02 ±	3.31g0.01 ±	3.02f0.01 ±
T6	4.75d0.02 ±	3.63d0.01 ±	3.28d0.01 ±
T7	4.64e0.02 ±	3.56e0.02 ±	3.22d0.01 ±
T8	4.96b0.02 ±	3.82b0.02 ±	3.41b0.01 ±
T9	4.88c0.01 ±	3.74c0.01 ±	3.35c0.01 ±
Sig.	*	*	*

Table (4) shows the effect of using *aloe vera* oil extracted locally and imported on cooking losses of breast, thigh and drumsticks of broiler carcasses, it was observed a significant decrease ($P \leq 0.05$) in favor of the T3 treatment, which was significantly ($P \leq 0.05$) over the T2 and T5 treatments, then T4 treatment, then T7 treatment, then T6 treatment, then T9 treatment, then T8, was a significantly low ($P \leq 0.05$) compare with T1, there were no significant differences between the treatments T2 and T5. As for the thigh meat, a significant decrease ($P \leq 0.05$) was noted for treatment T3 compared to treatment T2 and T4, then T8 and T9 treatments, was a significantly lower ($P \leq 0.05$) compared to the control treatment, there were no significant differences between the treatments T2, T4 and T7 and between the treatments T2, T4 and T5 and between

the treatments T6, T7 and T9 and the treatments T6, T8 and T9. Also, a significant decrease ($P \leq 0.05$) was observed for treatment T3 in relation to the drumstick meat, compared to treatment T2 and T4, were a significantly low ($P \leq 0.05$) compared to control treatment and treatments T8 and T9, there were no significant differences between treatments T1, T8 and T9 and treatments T6, T7, T8 and T9 and treatments T2, T4, T6 and T7 and treatments T2, T4 and T7 and treatments T3 and T5. The average cooking loss of breast meat were 36.04, 35.17, 35.07, 35.34, 35.22, 35.93, 35.76, 36.19 and 36.06. The average cooking losses of thigh meat were 28.04, 26.94, 26.45, 26.92, 26.78, 27.40, 27.28, 27.68 and 27.56. The average cooking loss of drumstick meat were 26.64, 25.84, 25.40, 25.85, 25.68, 26.11, 26.07, 26.34 and 26.26, for treatments respectively.

Table (4) Impact of using aloe vera oil local extracted and imported on the cooking loss for breast, thigh and drumstick of broiler carcass \pm standard error.

Treatments	Breast	Thigh	Drumstick
T1	36.43a0.05 \pm	28.04a0.03 \pm	26.64a0.05 \pm
T2	35.17g0.01 \pm	26.94de0.35 \pm	25.84cd0.35 \pm
T3	35.07h0.02 \pm	26.45f0.03 \pm	25.40e0.02 \pm
T4	35.34f0.02 \pm	26.92de0.02 \pm	25.85cd0.03 \pm
T5	35.22g0.01 \pm	26.78ef0.008 \pm	25.68de0.04 \pm
T6	35.93d0.04 \pm	27.40bc0.02 \pm	26.11bc0.01 \pm
T7	35.76e0.02 \pm	27.28cd0.01 \pm	26.07bcd0.01 \pm
T8	36.19b0.02 \pm	27.68b0.04 \pm	26.34ab0.02 \pm
T9	36.06c0.02 \pm	27.56bc0.01 \pm	26.26ab0.02 \pm
Sig.	*	*	*

The reason for the low percentage of lost weight may be attributed to thawing, in favor of locally extracted aloe vera oil treatments compared to imported aloe vera oil and control, to the role of active compounds in aloe vera leaf oil. The most important of which are aloin and emodin, which are natural antioxidants, keeping the fat molecules from oxidation, by inhibiting free radicals, which limits the rupture of the cell membrane surrounding the muscle fiber, then prolonging the life of the loofah and preserving it, which gives a role to the fleshy tissues by increasing their ability and ability to retain water and prevent fluid loss (Zapata

and Pava, 2017). The reason for the decrease in cooking losses may be attributed to locally extracted aloe vera oil treatments, to the role of the active compounds and the chemical composition of aloe vera leaves (Poursalehi *et al.*, 2021). Also, the increased loss of meat liquids will make the meat drier and more solid, the loss of the natural flavor of the meat, as well as the role of the active compounds, and retain water increases due to its low solubility (Jogeswar *et al.*, 2023).

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