



Salahaddin university_Erbil

Influence different levels of dietary ginger powder on broiler blood serum and production

A Graduate Research project submitted to the council of the college of Education-Shaqlawa at Salahaddin University in partial Fulfilment of the requirement for degree of Bachelor of Biology science in Education.

Prepared by:

Solav salh mustafa

Supervised by :

Mr.Peshraw Abdulkarim Othman

2022-2021

(بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ)

In the Name of Allah

{۱۷}{وَيُسْقَوْنَ فِيهَا كَأْسًا كَانَ مِزَاجُهَا زَنْجَبِيلًا}

(17) And they will be given to drink a cup [of wine] whose mixture is of ginger

{۱۸}{عَيْنًا فِيهَا تُسَمَّى سَلْسَبِيلًا}

(18) [From] a fountain within it [i.e., Paradise] named Salsabeel.

سورة الإنسان

[Al-Insān]

DEDICATION

This Research Project is dedicated to:

Allah Almighty, my Creator and my Master,

My great teacher and messenger, Mohammed (May Allah bless and grant him), who taught us the purpose of life,

My homeland Kurdistan, the warmest womb,

The University of Salahaddin-Erbil; my second magnificent home;

My great parents, who never stop giving of themselves in countless ways,

My beloved brothers and sisters;

To all my family, the symbol of love and giving,

My friends who encourage and support me,

All the people in my life who touch my heart.

ACKNOWLEDGEMENT

Before all great thanks for Allah, the most merciful.

A great appreciation goes thank to (Mr.peshraw) my supervisor, who was always there for me to listen and give advice. We had many insightful conversations during the development of ideas. She is the person who inspired me for this work and showed me different ways to approach a problem and how to deal with it in a fruitful manner.

Special appreciation is also due to the (Mr .Sherko) head of biology department for the great support and kind help during the period of our study.

Last but not least, a warm thanks and deep appreciation are due to my family for her patience, great support and continuous encouragement during this study.

Finally our thanks are to all of those people who help us in this research.

List of contents

Chapter	Titles	Pages
1	Introduction	1
2	Review of Literature	2
2-1	Ginger botanical cultivation	2
2-2	Form of ginger	2
2-2-1	Fresh ginger or whole raw roots	2
2-2-2	Dried ginger	6
2-2-3	Ginger oil	6
2-2-4	Crystallized ginger	7
2-2-5	Pickled ginger	8

2-2-6	Ground and powdered ginger	10
2-2-7	Preserved ginger	11
2-3	Herbal and industrial use of ginger	11
2-4	Ginger and its health effect	
2-4-1	Antioxidant properties of ginger	
2-5	Anti-inflammatory effects of ginger	
2-6	Effect of dietary ginger on broiler serum	
3	Conclusion	
	References	

1.INTRODUCTION

To improve the performance of broiler rations, a variety of feed additives are used. Spices are frequently used as beneficial additions in broiler diets. (Zhang, Yang et al. 2009) Plant active principles are chemical substances found throughout the plant or in specific areas of the plant that have medicinal or helpful properties. (Martins, Salgueiro et al. 2001) Spices and herbs may provide a variety of health and performance benefits for broilers, including antioxidant potential.. (Hui 1996), as well as antibacterial activity (Dorman and Deans 2000). activating endogenous enzymes to improve digestion (Brugalli 2003). Ginger (*Zingiber officinale*) is widely used as a food condiment and a medicinal herb in many cultures. (Chrubasik, Pittler et al. 2005) Gingerol, gingerdiol, and gingerdione are the most important molecules in Ginger (*Zingiber officinale*), and they have the capacity to accelerate digestion. Enzymes have an impact on microbial activity and have oxidative action.) (Mohamed, Al-Rubae et al. 2012) (When employed in broiler diets, it has a positive impact .Ginger (*Zingiber officinale*) Supplementation enhanced antioxidant and blood serum levels in broiler chickens. (Zhang, Yang et al. 2009) The therapeutic effects of *Zingiber officinale* have been reported to include analgesic, antiemetic, antiulcer, pyretic, and cardiac depressive. among others (Utpalendu, Chattopadhyay et al. 1999) antioxidant and reducing free radicals damage ,increase production and reproduction and improve animals health (Bosisio, Benelli et al. 1992)

2.Review of lecturers

2.1Ginger: Botany and Cultivation

Although it is commonly referred to as "ginger root," ginger is a monocotyledonous plant with a rhizome Unlike cassava (*Manihot esculenta*), the rhizome is a modified underground stem similar to that of yams (*Dioscorea* spp.) that produce stem tubers. . The presence of nodes, buds, and scales distinguishes it from the root. Ginger is a perennial herb that is cultivated as an annual crop. The plant grows to be around 35-100 cm tall, with densely branching rhizomes known as "races" or "hands," and branches known as "fingers." Flowering is rare, but when it does happen, the inflorescence grows directly from the root stock. Bright green lance-shaped leaves with a noticeable longitudinal rib enclosing conical clusters of miniature yellow-green flowers with purple speckles are 15 - 20 cm (6-8 in) long and have a prominent longitudinal rib. (Khan, Naz et al. 2012).eritic loams are preferred for higher yields

2.2FORMS OF GINGER

Fresh, dried, pickled, preserved, crystallized (or candied) ginger comes in a variety of forms, including powdered or ground. (Khan, Naz et al. 2012)Dried ginger is the most frequent form of ginger.

2.2.1Fresh ginger or Whole Raw Roots Fresh

ginger comes in two varieties young and mature. Young ginger has a mild flavor and a thin, light skin that does not need to be peeled. The skin of mature ginger, on the

other hand, is tough, and getting to the fibrous flesh takes peeling. Before used, it is either chopped or grated.

2.2.2 Dried ginger: Whole fingers and slices of dried ginger are offered. The root skin is either left on or scraped off when dried roots are sold. The roots of dried skinless ginger

are cooked in water to destroy the rhizomes. The skin can also be removed by peeling, scraping, or slicing. It is soaked in the recipe liquid before use. It is possible to extract oil from dried ginger

2.2.3 Ginger oils:

Steam distillation is used to obtain ginger oil from the plant's root. It's used for antibacterial, aphrodisiac, laxative, stimulant, and tonic characteristics, and it's frequently used with other essential oils to make a variety of mixes for a variety of diseases. The perfume of ginger oil is spicy and peppery.

2.2.4 Crystallized ginger:

Candied ginger is made by cooking ginger in sugar syrup, then air drying it and coating it in sugar.

2.2.5 Pickled ginger:

The ginger root is thinly sliced and pickled in a sweet vinegar solution. This pickle is frequently served with sushi as a palette cleanser in between dishes. It's either pink or red in color.

2.2.6 Ground or Powdered Ginger:

The buff-colored ground spice prepared from dried rhizome is known as ground or powdered ginger. It's used in a variety of dishes.

2.2.7 Preserved ginger:

Fresh young rhizomes are peeled and sliced, then boiled in a strong sugar–salt mixture to make preserved ginger or stem ginger. The syrup and ginger bits are canned together. They're mushy and pulpy on the outside, but incredibly hot and spicy on the inside. It's used in both desserts and confections.

2.3 HERBAL AND INDUSTRIAL USES OF GINGER

In folk medicine, ginger has been used to treat minor gastrointestinal issues like gas and stomach pains. (Kulkarni, Deshpande et al. 2012). Fresh ginger juice has long been used in traditional medicine to treat burns and minor skin irritations. Ginger's applications aren't limited to its raw form; the oil extracted from ginger has been shown to be curative in a variety of conditions, and it's also been utilized in herbal treatment to alleviate pain and other issues.

(Kulkarni, Deshpande et al. 2012). In recent years, some spas have begun to utilize ginger oil to provide a refreshing effect. both the intellect and the body

Even ginger tea with honey is recommended for cough and cold relief as well as improved digestion. (Kulkarni, Deshpande et al. 2012). Dried ginger root powder is sometimes put into capsules and given as a supplement.

Ginger is a spicy, aromatic household spice. (McGee 2007). Young ginger rhizomes are fleshy and juicy, with a moderate flavor. As a snack, they're frequently pickled in vinegar or sherry, or simply cooked as an ingredient in a variety of cuisines. They can also be steeped in boiling water to make ginger tea, which is commonly sweetened with honey and garnished with sliced orange or lemon fruit. Ginger can be converted into candy or ginger wine, which has been commercially produced since 1740.(Baliga, Haniadka et al. 2012)

Ginger is an excellent food preservative.(Baliga, Haniadka et al. 2012). Fresh ginger can be used in place of ground ginger at a 6 to 1 ratio, though the flavors of fresh

and dried ginger differ slightly. Dry ginger root powder is commonly used to flavor gingerbread, cookies, crackers, and cakes, as well as ginger ale and ginger beer.

2.4 GINGER AND ITS HEALTH EFFECTS

Ginger and its metabolites looked to accumulate in the gastrointestinal system, thus the consistent reports of ginger exerting many of its actions in this location are not surprising. (Wachtel-Galor 2011) Ginger has been used for thousands of years to cure a number of maladies, from colds to cancer, and has been reported to have a variety of potent therapeutic and preventive properties. Much of the information about this medicinal herb has been passed down by word of mouth, with little controlled scientific proof to back up the numerous claims. More systematic scientific investigations have focused on the mechanisms and targets of ginger and its many components in recent years. (Wachtel-Galor 2011)

2.4.1 Antioxidant Properties of Ginger

The existence of oxidative stress is linked to a variety of ailments, and one prominent mechanism used to explain ginger's actions and health benefits is its antioxidant qualities. (Ahmad, Katiyar et al. 2001) Ginger has been shown to reduce oxidative stress markers associated with aging. (Topic, Tani et al. 2002) It was found to protect rats from ethanol-induced hepatotoxicity by reducing oxidative effects in ethanol-treated rats. (Mallikarjuna, Chetan et al. 2008). Only pomegranate and several types of berries have a higher level of total antioxidants (3.85 mmol/100 g) than ginger root. (Halvorsen, Holte et al. 2002)

2.4.2 Anti-Inflammatory Effects of Ginger

One of the many health benefits linked to ginger is its ability to reduce inflammation, swelling, and pain. [6]-gingerol is a dried ginger extract. (Young et al., 2005) and a extract enhanced with dried gingerol (Minghetti et al., 2007) Each was shown to

have analgesic and anti-inflammatory properties. According to previous animal research, rats with [6]-gingerol in their hind limbs produced more heat, which was linked to increased oxygen use and lactate outflow. (Eldershaw et al., 1992). Thermogenesis was linked to vasoconstriction, which was unrelated to adrenergic receptors or subsequent catecholamine release. Larger doses of ginger components, on the other hand, inhibited oxygen consumption, which was attributed to mitochondrial dysfunction. (Eldershaw et al., 1992) A later study found that rats given a single intraperitoneal injection of [6]-gingerol (2.5 or 25 mg/kg) experienced a rapid, significant drop in body temperature and a significant reduction in metabolic rate. (Ueki et al., 2008).

to the eye or to the rear paw following a subcutaneous injection (Iwasaki et al., 2006). The majority of the ginger components in this study also increased adrenal catecholamine release, which increases energy consumption. (Iwasaki et al., 2006).

In vitro and ex vivo, the majority of scientific evidence suggests that ginger and its various components have anti-inflammatory properties. However, the evidence for ginger's efficacy as an anti-inflammatory agent in humans in vivo is still mixed and incomplete. (Ann & Zigang, 2011)

2.5 Effect of dietary ginger on broiler serum:

A study was conducted by (Mohamed et al., 2012) they indicated that ginger had a significant effect on many blood serum traits. The very minute amounts of ginger had a very strong impact as antilipdemic effect on serum cholesterol and triglycerides plus. Ginger had many active compounds such as atsiri oil, borneol, kamfen, limonene, humulen, gingibrol, gingeriberen and gingerdiol (Rismunandar, 1988), all these compounds improves feed digestion and stimulate its enzymes and thus enhancing feed conversion ratio which lead to increase of body weight gain as

we noticed in this study (Conley, 1997). The hypolipidemic action of ginger supplementation can be used to lower risk factor of the cardiovascular diseases and cancer either in animals or human (Ademola et al., 2009). The supplementation of ginger reduced cholesterol levels in blood serum because of its antioxidative action which also a mechanism could be used as anti-stress approach (Jang et al., 2007). The hypocholesterol action may be done by ginger acting as a potential inhibitor of cholesterol synthesis (Said et al., 2010). However, ginger have a positive effect on lowering effect on blood serum cholesterol, triglycerides and glucose, which can refer to strong 'anti-oxidative action and potential anti stress action.(table 1)

Table1: blood serum parameters of the broiler fed different levels of ginger (zingiber officinale)

parameters	Treatment		
	T ₁	T ₂	T ₃
Cholesterol(mg/dl)	126.40^a±4.610	119.30^b±4.410	115.89^b±3.380
Triglyceride (mg/dl)	116.10^a±1.920	108.20^b±1.180	107.42^b±1.880
Glucose (mg/dl)	164.21^a±1.040	153.56^b±1.090	150.21^b±1.070
Total protein (g/dl)	5.66^a±0.058	5.38^a±0.139	5.40^a±0.216

T1 served as control while T2 and T3 were kept on feed containing 0.1 and 0.2% ginger ,respectively.

values (mean ±SD)of each experimental day in each column followed by different letters differ significantly(p≤0.05)

Another study was carried out by (Al-Khalaifah et al 2022) they revealed that The effects of different levels of ginger powder on blood cholesterol, triglyceride, HDL, and VLDL levels are shown in Table 2. A significant decrease in total cholesterol (TC) was observed in treatment groups supplemented with 5–15 g/kg ginger powder.

A similar trend was also observed in total glycerides (TG). The HDL levels were found to be increased ($p \leq 0.05$) in treatment groups fed 5–15 g/kg ginger powder, compared to the control group. However, LDL levels in the supplemented birds were decreased ($p \leq 0.05$)

Table2: the effects of different levels of ginger power on blood cholesterol ,triglyceride ,high and low density lipoprotein content in broiler chickens

TC, mg/dl	160^a	145^b	140^b	121^c	8.00	<0.001
TG, mg/dl	40.0^a	28.5^b	25.2^b	22.8^b	5.5	<0.001
HDL, mg/dl	69.8^a	83.0^b	90.9^b	92.9^b	7.9	<0.001
LDL, mg/dl	60.7^a	29.9^b	27.8^b	30.1^b	5.6	<0.001

All treatment groups received a soybean basal diet. Mean within rows with different letters are statically different at $p \leq 0.05$, $n=5$, total cholesterol (TC), triglyceride (TG), high-density lipoprotein (HDL), and low density lipoprotein (LDL).

Conclusions

Ginger inclusion in the broiler diet can be safely used to enhance immune response, and antioxidative status of broiler chickens.

References

Ahmad, N., et al. (2001). "Antioxidants in chemoprevention of skin cancer." CURRENT PROBLEMS IN DERMATOLOGY-BASEL **29**: 128-139.

Baliga, M. S., et al. (2012). "Radioprotective effects of Zingiber officinale Roscoe (ginger): past, present and future." Food & function **3**(7): 714-723.

Bosisio, E., et al. (1992). "Effect of the flavanolignans of Silybum marianum L. on lipid peroxidation in rat liver microsomes and freshly isolated hepatocytes." Pharmacological Research **25**(2): 147-165.

Brugalli, I. (2003). "Alimentação alternativa: a utilização de fitoterápicos ou nutracêuticos como moduladores da imunidade e desempenho animal." Simpósio sobre manejo e nutrição de aves e suínos **1**: 167-182.

Chrubasik, S., et al. (2005). "Zingiberis rhizoma: a comprehensive review on the ginger effect and efficacy profiles." Phytomedicine **12**(9): 684-701.

Dorman, H. D. and S. G. Deans (2000). "Antimicrobial agents from plants: antibacterial activity of plant volatile oils." Journal of applied microbiology **88**(2): 308-316.

Halvorsen, B. L., et al. (2002). "A systematic screening of total antioxidants in dietary plants." The Journal of nutrition **132**(3): 461-471.

Hui, Y. (1996). "Bailey's Industrial Oil and Fat Products. V. 5. Industrial and Consumer Nonedible Products from Oils and Fats."

Khan, R., et al. (2012). "Potential applications of ginger (*Zingiber officinale*) in poultry diets." World's Poultry Science Journal **68**(2): 245-252.

Kulkarni, R., et al. (2012). "Ginger supplementary therapy for iron absorption in iron deficiency anemia."

Mallikarjuna, K., et al. (2008). "Ethanol toxicity: Rehabilitation of hepatic antioxidant defense system with dietary ginger." Fitoterapia **79**(3): 174-178.

Martins, A., et al. (2001). "Essential oil composition and antimicrobial activity of three Zingiberaceae from S. Tome e Principe." Planta Medica **67**(06): 580-584.

McGee, H. (2007). On food and cooking: the science and lore of the kitchen, Simon and Schuster.

Mohamed, A. B., et al. (2012). "Effect of Ginger (*Zingiber officinale*) on Performance and." International Journal of Poultry Science **11**(2): 143-146.

Topic, B., et al. (2002). "Enhanced maze performance and reduced oxidative stress by combined extracts of *Zingiber officinale* and *Ginkgo biloba* in the aged rat." Neurobiology of aging **23**(1): 135-143.

Utpalendu, J., et al. (1999). "Preliminary studies on anti-inflammatory activity of *Zingiber officinale* Rosc., *Vitex negundo* Linn and *Tinospora cordifolia* (willid) Miers in albino rats." Indian journal of pharmacology **31**(3): 232.

Wachtel-Galor, S. (2011). Herbal medicine: biomolecular and clinical aspects, CRC press.

Zhang, G., et al. (2009). "Effects of ginger root (*Zingiber officinale*) processed to different particle sizes on growth performance, antioxidant status, and serum metabolites of broiler chickens." Poultry science **88**(10): 2159-2166.

