ОШ МАМЛЕКЕТТИК УНИВЕРСИТЕТИНИН ЖАРЧЫСЫ. АЙЫЛ ЧАРБА: АГРОНОМИЯ, ВЕТЕРИНАРИЯ ЖАНА ЗООТЕХНИЯ

ВЕСТНИК ОШСКОГО ГОСУДАРСТВЕННОГО УНИВЕРСИТЕТА. СЕЛЬСКОЕ ХОЗЯЙСТВО: АГРОНОМИЯ, ВЕТЕРИНАРИЯ И ЗООТЕХНИЯ

JOURNAL OF OSH STATE UNIVERSITY. AGRICULTURE: AGRONOMY, VETERINARY AND ZOOTECHNICS

e-ISSN: 1694-8696
№4(9)/2024, 28-35

ВЕТЕРИНАРИЯ

УДК: 636.5.636.6.
DOI: https://doi.org/10.52754/16948696_2024_4(9)_5

ATHEROGENICITY INDEX, «GOOD» LIPOPROTEINS AND THE RATIO OF TOTAL CHOLESTEROL AND PROTEIN OF BROILER CHICKENS IN THE HEALTH SYSTEM

АТЕРОГЕНЕЗДИН ИНДЕКСИ, «ЖАКШЫ» ЛИПОПРОТЕИНДИН ЖАНА ДЕН СООЛУКТУ БААЛОО СИСТЕМАСЫНДАГЫ БРОЙЛЕР ТООГУНУН ЖАЛПЫ ХОЛЕСТЕРИНДИН ЖАНА БЕЛОКТУН КАТЫШЫ

ИНДЕКС АТЕРОГЕННОСТИ, «ХОРОШИЕ» ЛИПОПРОТЕИНЫ И СООТНОШЕНИЕ ОБЩЕГО ХОЛЕСТЕРИНА И БЕЛКА У ЦЫПЛЯТ – БРОЙЛЕРОВ В СИСТЕМЕ ОЦЕНКИ ИХ ЗДОРОВЬЯ

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ATHEROGENICITY INDEX, «GOOD» LIPOPROTEINS AND THE RATIO OF TOTAL CHOLESTEROL AND PROTEIN OF BROILER CHICKENS IN THE HEALTH SYSTEM

Abstract

Correct statistical analysis of the distribution of lipoproteins of different density and ratios of cholesterol fractions in the body of broiler birds will determine the biological quality of the final products obtained in poultry farming. The aim of the work was to determine the atherogenic index, the ratio of atherogenic and antiatherogenic lipoproteins, total cholesterol and protein in the early postembryonic ontogenesis of broiler chickens to characterize the health-preserving qualities of poultry meat products. HDL-C, mmol/l in broiler chickens Hubbard ISA F15 according to the Kolmogorov-Smirnov test, the significance level was more than two tenths p>0.20, d=0.21282, Lilliefors test, the significance level of HDL-C concentrations: p>0.20; Shapiro-Wilk test, the concentration of HDL-C had a significance level of p=0.02041, W=0.81224. Kolmogorov-Smirnov and Lilliefors tests to test the distribution of HDL-C concentration, mmol/l in Hubbard ISA F15 broiler chickens for compliance Gauss's law on the normal distribution of quantities. By 7 days. AI significantly decreased by 56.38% p≤0.001, the LDL-C/HDL-C ratio significantly decreased by 62.78% p≤0.001. At 23 days and 42 days age period, the physiological dynamics of IA and LDL-C/HDL-C stabilized, so although by the 23rd day age compared to 7 days. period, the AI value increased by 47.95%, LDL-C/HDL-C increased by 13.55%, the difference was not significant. In this regard, we emphasize that the dynamics of the atherogenicity index, the ratio of lipoproteins, total cholesterol and protein in the early postembryonic period of broiler chickens, that is, in the technological period of poultry meat production, showed a tendency to stabilization of the effective concentration of high-density lipoprotein cholesterol, a moderate concentration of low-density lipoprotein cholesterol, in the process of intensive growth and development of skeletal muscles.

Keywords: atherogenic index, lipoproteins, cholesterol, triglycerides, health-saving technologies, broiler chickens.

Атерогенездин индекси, «жакшы» липопротеиндин жана ден соолукту баалоо системасындагы бройлер тоогунун жалпы холестериндин жана белоктун байланышы

Индекс атерогенности, «хорошие» липопротеины и соотношение общего холестерина и белка у цыплят-бройлеров в системе оценки их здоровья

Аннотация
Ар кандай тыгыздыктагы липопротеиндердин таралышын жана бройлер тооктарынын организминдеги холестерин фракцияларынын катышын туура статистикалык талдоо канаттуулар чарбасында алынган акыркы продуктунун биологиялык сапатын аныктоого мүмкүндүк берет. Иштин максаты – канаттуулардын эт азыктарынын ден соолукту сактоочу сапаттарын мүнөздөө үчүн бройлер тооктарынын эрте постэмбриондук онтогенезиндеги атерогендиктин индексин, атерогендик жана антиатерогендик липопротеиндердин, жалпы холестериндин жана белоктун катышын аныктоо. CH-LPVP, бройлер балапандарындагы ммоль/л Хаббард ISA F15 Колмогоров-Смирнов критерийи боюнча, эки ондуктан жогору маанилик деңгээли r>0,20, d=0,21282, Lilliforce тести, CH-LPVP концентрацияларынын маанилик деңгээли: p>0.20; Шапиро-Вилк тестине ылайык, HC-LDV концентрациясынын деңгээлинин мааниси p=0,02041, W=0,81224. Колмогоров-Смирнов жана Лиллифорс тести Гаусс мыйзамы же нормалдуу бөлүштүрүү мыйзамы боюнча бройлер балапандарында HDL холестерол концентрациясын, ммоль/л бөлүштүрүүнү текшерүү үчүн Хаббард ISA F15. 7 күн болду. AI кыйла 56,38% p<0,001 чейин төмөндөгөн, CH-LDLN/CH-LDL катышы кыйла 62,78% p<0,001 чейин төмөндөгөн. 23 күндүк жана 42 күндүк курак мезгилдеринде IA жана HDL-LDL/HDL-HDL физиологиялык динамикасы 7 күндүк куракка салыштырмалуу 23 күндүк өсүш болсо да, турукташтыы. мезгил ичинде AI наркы 47,95% га, CH-LPNP/CH-LPVP 13,55% га өскөн, айырма ишенимсиз болгон. Ушуга байланыштуу бройлер тооктарынын алгачкы постэмбриондук мезгилинде, башкача айтканда, эт өндүрүүнүн технологиялык мезгилинде атерогендүүлүктүн индексинин динамикасы, липопротеиндердин, жалпы холестериндин жана белоктун катышы турукташтыруу тенденциясына ээ болгондугун баса белгилейбиз. жогорку тыгыздыктагы липопротеиддердин холестериндин эффективдүү концентрациясы, скелет булчуңдарынын интенсивдүү өсүшү жана өнүгүү процессинде төмөн тыгыздыктагы липопротеиддердин орточо концентрациясы.

Ачкыч сөздөр: атерогендик индекси, липопротеин, холестерин, триглицерид, ден соолукту сактоочу технологиялар, бройлер тоок.

Аннотация
Правильный статистический анализ распределения липопротеинов различной плотности и соотношения фракций холестерина в организме кур-бройлеров позволит определить биологическое качество конечной продукции, получаемой в птицеводстве. Цель работы - определить индекс атерогенности, соотношение атерогенных и антиатерогенных липопротеинов, общего холестерина и белка в раннем постэмбриональном онтогенезе цыплят-бройлеров для характеристики здоровье сберегающих качеств продуктов из мяса птицы. ХС-ЛПВП, ммоль/л у цыплят-бройлеров Хаббарда ИСА F15 по критерию Колмогорова-Смирнова, уровень значимости более двух десятых p>0,20, d=0,21282, тест Лиллифорса, уровень значимости концентраций ХС-ЛПВП: p >0,20; По тесту Шапиро-Уилка концентрация ХС-ЛПВП имела уровень значимости p=0,02041, W=0,81224. Тесты Колмогорова-Смирнова и Лиллифорса для проверки распределения концентрации холестерина ЛПВП, ммоль/л у цыплят-бройлеров Хаббарда ISA F15 на соответствие закону Гаусса о нормальном распределении величин. К 7 дням. ИИ достоверно снизился на 56,38% p<0,001, соотношение ХС-ЛПНП/ХС-ЛПВП достоверно снизилось на 62,78% p<0,001. В 23-дневный и 42-дневный возрастные периоды физиологическая динамика ИА и ХС-ЛПНП/ХС-ЛПВП стабилизировалась, хотя к 23-дневному возрасту по сравнению с 7-дневным возрастом. за период значение ИИ увеличилось на 47,95%, ХС-ЛПНП/ХС-ЛПВП увеличилось на 13,55%, разница была недостоверной. В связи с этим подчеркнем, что динамика индекса атерогенности, соотношения липопротеинов, общего холестерина и белка в раннем постэмбриональном периоде цыплят-бройлеров, то есть в технологическом периоде производства мяса птицы, имела тенденцию к стабилизации. эффективная концентрация холестерина липопротеинов высокой плотности, умеренная концентрация холестерина липопротеинов низкой плотности в процессе интенсивного роста и развития скелетных мышц.

Ключевые слова: индекс атерогенности, липопротеины, холестерин, триглицериды, здоровьесберегающие технологии, цыплята-бройлеры.

Introduction

Poultry meat contains all the nutrients, including proteins and lipids that can meet the recommended daily allowance for humans in vitamins and minerals [1–5].

Low-density lipoprotein cholesterol (LDL-C), the most atherogenic lipoprotein obtained by humans through food, has a cytotoxic effect, promotes the formation of atherosclerotic plaques on the walls of blood vessels and the development of chronic atherosclerosis with the risk of coronary disease and myocardial infarction [7–10].

An integral indicator of the blood lipid spectrum is the atherogenic index (AI), which reflects the ratio of cholesterol of atherogenic lipoproteins (LDL-C) to anti-atherogenic (HDL-C) [7, 11].

A high prognostic value of IA has been established in relation to the risk of death from diseases associated with atherosclerosis [7, 12].

The ratio of LDL-cholesterol (LDL-C) to HDL-cholesterol (HDL-C), that is, LDL-C/HDL-C, has been proven to be the best predictor of the severity of atherosclerosis processes, coronary heart disease, compared with taking into account the concentration of LDL-C or HDL-C by separately [13, 14].

Purpose of the work – determination of the atherogenic index, the ratio of atherogenic to antiatherogenic lipoproteins, total cholesterol and protein in the early postembryonic ontogenesis of broiler chickens to characterize the health-saving qualities of meat poultry products.

Material and research methods

Blood was taken from Hubbard ISA F15 broiler chickens grown by an industrial herd at «Chebarkulskaya Ptitsa» LLC (Chebarkulsky district of the Chelyabinsk region, Russia). Of which 4 groups were formed (n=40): 1-day; 7 days; 23 days; 42 days. Total protein (TP), g/l, was determined in blood serum by electrophoresis. High-density lipoprotein cholesterol (HDL-C) in mmol/l was determined in blood plasma using the «Vector-Best» kit by the enzymatic method; using the «Olvex Diagnosticum» kit, total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) were determined in mmol/l. The atherogenic index (AI) was calculated in conventional units (c.u.); ratios were calculated: LDL-C/HDL-C, c.u., (TC/TP) × 100%, in % and (LDL-C/TC) × 100%, %. The average daily weight gain Asp in g/day was determined. The normality of the distribution of values was determined by the Shapiro-Wilk, Kolmogorov-Smirnov and Lilliefors tests, Student's t-test was used; for HDL-C, a sign test was used. $p \leq 0.05$ was taken as the critical level of significance of differences in values when testing statistical hypotheses.

Results and discussion

According to the results of comparing the criteria for the normality of the distribution of HDL-C, mmol/l in broiler chickens Hubbard ISA F15 according to the Kolmogorov-Smirnov test, the significance level was more than two tenths $p>0.20$, $d=0.21282$. Similarly, according to the Lilliefors test, the significance level of HDL-C concentrations: $p>0.20$; therefore, according to these criteria, the hypothesis of normal distribution is confirmed. At the same time, according to the results of the Shapiro-Wilk test, the concentration of HDL-C had a significance level of $p=0.02041$, $W=0.81224$ (Fig. 1: 1.1).

Also, according to the graph of the normal probability distribution of values, systemic deviations from the theoretical straight line of the normal distribution of HDL-C values were established (Fig. 1: 1.2).

Therefore, the combined application of the Shapiro-Wilk test with the calculation of the plot of the normal probability distribution of values received a proven advantage in efficiency compared to using the Kolmogorov-Smirnov and Lilliefors tests to test the distribution of HDL-C concentration, mmol/l in Hubbard ISA F15 broiler chickens for compliance Gauss's law on the normal distribution of quantities (Fig. 1).

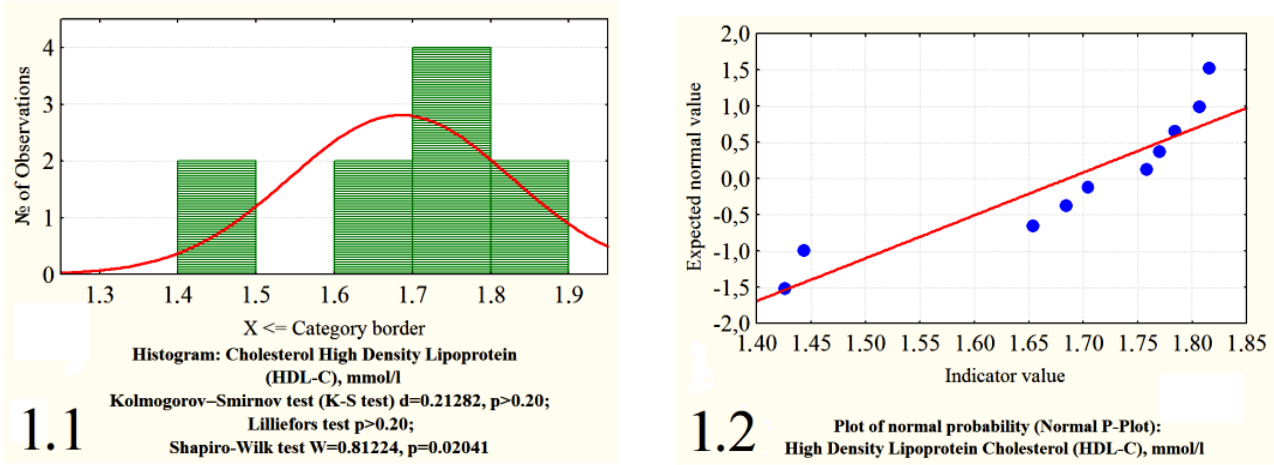

Figure1. Checking the normal distribution of high-density lipoprotein cholesterol (HDL-C), mmol/l in broiler chickens according to the results: 1.1 - Kolmogorov-Smirnov test, Lilliefors test and Shapiro-Wilk test; 1.2 - Plot of normal probability

By 7 days. AI significantly decreased by 56.38% p≤0.001 (Fig. 2), the LDL-C/HDL-C ratio significantly decreased by 62.78% p≤0.001 (Fig. 2).

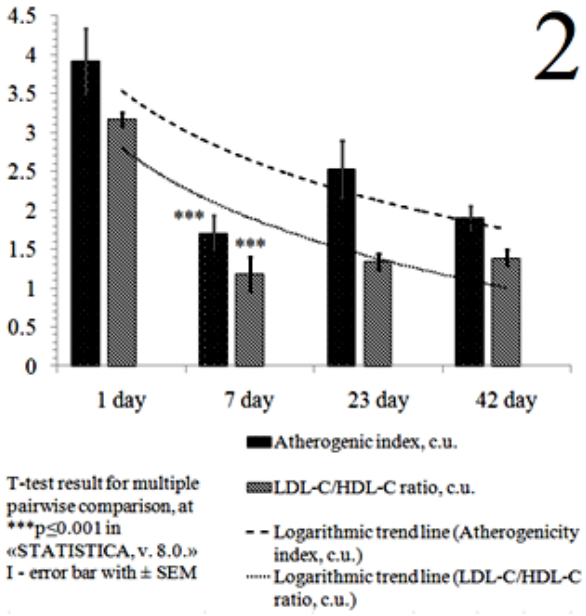

Figure2. The values of the atherogenic index and the ratio of low-density lipoprotein cholesterol (LDL-C) to high-density lipoprotein cholesterol (HDL-C) (in conventional units) in the peripheral blood of broiler chickens in early postembryonic ontogenesis. SEM - standard error of the mean

At 23 days and 42 days age period, the physiological dynamics of IA and LDL-C/HDL-C stabilized, so although by the 23rd day age compared to 7 days. Period, the AI value increased by 47.95%, LDL-C/HDL-C increased by 13.55%, the difference was not significant (Fig. 2).

The ratio of LDL-C/TC by the 7th day age significantly decreased by 36.62% p≤0.05 and stabilized without significant change in the period of 23–42 days in relation to the age of 7 days within 41.77% - 31.0% (Fig. 3).

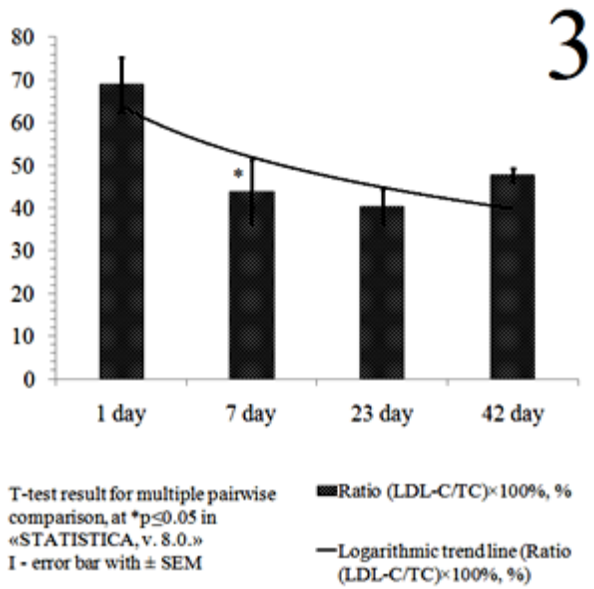

Figure3. The ratio of low-density lipoprotein cholesterol (LDL-C) to total cholesterol (TC) (in %) in the peripheral blood of broiler chickens in early postembryonic ontogenesis. SEM - standard error of the mean

The dynamics of TC/TP corresponded to the average daily weight gain and the physiological characteristics of broiler birds; TC/TP by the 7th day. Age significantly decreased by 65.45% p≤0.001 (Fig. 4).

Further to the 23rd day age, TC/TP volume slightly increased by 36.34% p≤0.05 (Fig. 4).

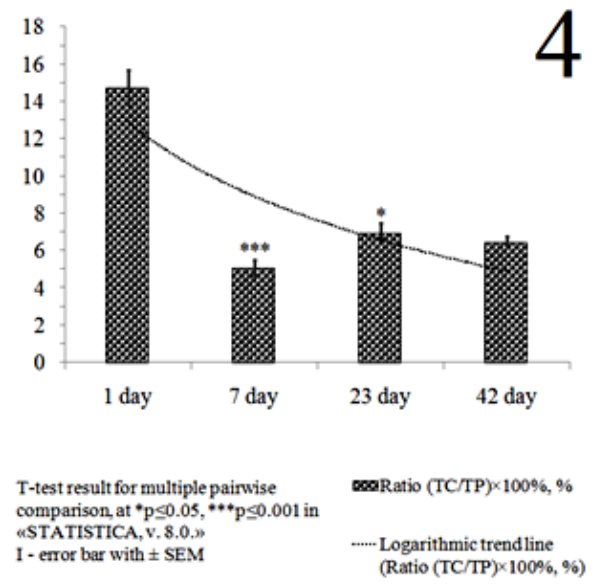

Figure4. Values of the ratio of total cholesterol (TC) to total protein (TP) (in%) in the peripheral blood of broiler chickens in early postembryonic ontogenesis. SEM - standard error of the mean

Significant change in TC/TP by day 42- period was not recorded.

Conclusions

Thus, the dynamics of the atherogenic index, the ratio of lipoproteins, total cholesterol and protein in the early postembryonic period of broiler chickens, that is, in the technological period of poultry meat production, showed a tendency to stabilize the effective concentration of high-density lipoprotein cholesterol, a moderate concentration of low-density lipoprotein cholesterol, in the process intensive growth and development of skeletal muscles.

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