UDC 636.59.59

SOME ASPECTS OF THE HISTORY FORMATION OF EGGS POULTRY

Y. Osadcha
National University of Life and Environmental Sciences of Ukraine

A causal analysis of the formation and development of scientific bases of selection and processes in the poultry industry are conducts. The basic stages of egg poultry are described. Three basic historical stages, linking development and technology selection are allocated. It was established that the first stage is marked direct cooperation with academic institutions breeders, intense rock formation and the formation of scientific bases automation and in the second half of the eighteenth century - the first half of the nineteenth century; second stage marked the transition from small-scale farming to industrial complexes, the intensification of farming and in the second half of the nineteenth century - the end of the twentieth century; the third stage is marked organization holdings, a period of intense vertical integration, industrialization sector modernization related industries and continues to the present.

Poultry, hens, breeding, crosses, hybrids, automation equipment, specialization, integration

Introduction. Comprehension scientific heritage, its use critical thinking and practice - important conditions for the development of modern science and practice. In this context, the current study is the history of development and selection processes in egg poultry. In our previous publications reviewed in detail information about the origin of chickens and their wild ancestors, time and place domestication, the main pathways of the world and the history of domestication, the emergence of specialization and breed creation process.

The **purpose of this study** is causal analysis of the formation and development of scientific bases of selection and processes in the poultry industry.

Poultry in VIII-XIX centuries

By the end of the nineteenth century chickens kept as private agricultural farms and estates in and landlords at royal courts. As a decoration in these estates held meat chicken breeds cochinchina, gate, faverolles and others. Since that time the chickens were more a source of aesthetic pleasure than food, XVIII - XIX centuries characterized by breeding chicken's plumage color and shape of the ridge. During this period they built more than 100 species and their varieties.

In this century begins to emerge poultry and eggs. Economic incentives for its development were the need to ensure food citizens. To date, the world created nearly 1,500, and possibly more species. For example, in Encyclopedia Stromberg names are 142 species of chickens [78], the Vandelts and Voltairs book [90] - 420 in Soums directory - 604 breeds and varieties, breeders have created 22 countries [76]. Some modern scholars believe that this figure can be increased twice [28].

The beginning of the process of concentration and cooperation poultry, some researchers believe the creation of the first Agricultural Society in Philadelphia in 1785 [81]. Further development of poultry contributed by Morrils signed in 1862 (Grand Land College) Act partnerships between US universities and agricultural companies. This contributed to the integration of research in the development of breeding hens [81].

The second half of the nineteenth century in different countries characterized by increased breed creation process in livestock, including poultry and opens new partnerships and poultry fan clubs, exhibitions and contests performance. The first exhibition breeds of chickens was held in Boston in 1849 [70.79], and in 1855 in Moscow [30].

During this period, actively developing artificial incubation of eggs. Although artificial incubation has its roots of ancient Egypt, the first effective incubator was created in Europe in the eighteenth century frenchman René Antoine Reosmyur. This first scientist proved that for the normal development of embryos eggs requires not only the optimum temperature, but also

sufficient ventilation [92]. By the early nineteenth century used several variations of incubation. The most famous were Arnoulds Hydroinkubation and apparatus Sartorius and incubators "special" plant Preeri (America) [29]. In 1854 was constructed first control slot accounting of individual egg laying [92]. These developments have greatly facilitated the maintenance breeding, streamlining accounting calves' origin, personality conclusion that increased the efficiency of selection of birds.

Getting XVIII – middle of the XIX century have been named the world's "Age of chicken" is because at this time developed traditions of consuming eggs. During this period has been discovered dietary quality of the product that prompted the beginning of the use of eggs as food. Boiled eggs for breakfast were the favorite dish of French and Parisian Sunday gathered in the square to watch as Louis XIV throws eggs at one stroke the top of forks [83]. In middle of the XIX century americans, following the example of the British, have been widely eaten eggs and bacon. At this time, the egg begins to use and bakery industry [52.84]. Significant progress in cooking helped work Le Cuisinier, published by Pierre Francois de Cooked in 1961. In the book, the author described the 60 recipes with eggs [80]. At the end of the nineteenth century eggs are popular product in the West, and the emphasis shifts from a selection of decorative type chickens to their productive characteristics.

Poultry XX century

By the early XX century chickens bred only small landowners and only in the 20's began to establish the first farm, breeding kennels poultry and hatching station. These were the first steps to intensify the poultry industry. At this time rapidly evolving chickens genetic. In 1930, A.S. Serebrovsky and S.G. Petrov was constructed a chickens genetic map and sequenced the complete genome sequence [55]. In the mid-90 years XX century begins studying QTL (quantitative trait loci) in chickens using microsatellite markers and methods fingerpryntyng. Based on the genetic maps of high accuracy in chickens were identified QTL for many features, including egg [73,85,91], the age of the demolition of the first eggs [72], the quality of eggs [85], the quality of the protein [50.69] shell quality [64.86], the presence of blood and meat inclusions [61], height [51,60,66,82], weight [57.75], feed efficiency [88], carcass quality [89], the quality meat [56], the fat content [62] and the process of depositing fat [63], resistance to Marek's disease [54,67,68,87,93,94], bacteria *Salmonella enteritidis* [65], the bacteria *Mycobacterium butyricum* and *coccidiosis* [96], Newcastle disease and plucking feathers [53] and feeding behavior [36]. Information on the mapping obtained during investigations QTL, allowed further localizes the 45 microsatellite consensus on the map which includes 2306 markers [74]. These studies formed the basis of a new breeding techniques - MAS (marker assisted selection) or marker selection [59]. The map coverage groups coupling molecular markers in combination with strong statistical methods facilitate genetic analysis of complex traits. Thus, in breeding hens began the process of reorientation of breeding phenotype to genotype selection directly.

In the second half of the XX century began the rapid development of industrial poultry based on getting cross that is highly productive hybrids by crossing lines of one or more species. Opening heterosis effect not only contributed to the significant growth of productivity of poultry, but also became the basis for the restructuring of the industry, its high specialization. The founder of this scientific approach was the American company "Long Line" which has applied to chickens hybridization method developed by breeder's corn. The first evaluated the advantages of the method and applied it to the European continent Dutch breeding company "Evribrid." In subsequent years, there is a flourishing breeding poultry science. Thus, if the banking chicken (*Gallus bankiva*) postponed only 8-15 eggs, from home in 1925 received 175 eggs, and modern laying hen lays 320-350 eggs [27].

Such productivity growth, uncontested, promotes new advances in feeding and breeding chickens. Improving technology to implement bird breeders established genetic potential. Chickens from private households gradually shifted to summer camp, and then in poultry houses. First, some farmers began to keep chickens indoors, floor covered with debris, as well as jacks used specially constructed wooden boxes [77].

Production tribal and commercial products to the mid-twentieth century were organized on the basis of extensive floor maintenance of walking, and spring and summer - in summer camps. Intensive system, which included keeping chickens indoors throughout their productive life, was first used in 1915 and soon became the most widespread [77].

In 1940-1950 years John Tyson was first constructed Cage equipment for breeding chickens [58]. In 1938, brothers Richard and Jack DeWitt was constructed first equipment for automated feeding chickens. In a further process automation Poultry developed rapidly enough. The most significant inventions of process automation in industrial poultry during this period were: industrial incubator [26] - improving sanitary conditions of poultry egg incubation, helps protect youngsters from aerogenic destruction, and the same air speed in trays reduces temperature and humidity gradients, providing thus the optimal mode of incubation and improving output quality and chickens; a device for turning the eggs in the incubator [16] - returns poultry eggs during incubation; regulator of humidity in the incubator chamber [3] - extends the range of adjustment of humidity in the incubator chamber, is simple and improves performance incubator; instrument to influence bird embryos electromagnetic field [20] - increases the effectiveness of electromagnetic fields on bird embryos and allows you to handle eggs with minimal loss of energy; incubator management system [18] - improves management of the incubator; automatic control of the incubator [25] - increases the quality control of the incubator and reliability of automatic control over the work of incubator provides enhanced functionality; software equipment for the job schedule light regime in poultry houses [1.34] - is designed to automatically provide many weeks light regime in poultry houses with a gradual increase in the duration of additional lighting; facilities for poultry [13] - improves hygiene conditions of poultry (due to more uniform air distribution along the length and height of the room), reduces the number of infections in the supply air (due to disinfection of ventilation ducts and insulation of buildings); Cage battery for keeping laying hens "TSYYPS-KBN" [2] - improves the conditions of laying hens; Bunk overall widely battery cages for hens egg breeds [4] - facilitates maintenance of bird on the second floor of the battery directly from the floor of the room without the use of ladders, stairways and trucks; Cage battery for poultry [24] - provides the necessary microclimate in the poultry; group cages for birds [9] - simplifies the operation of the cell by reducing labor costs to fix it in the open position, resulting in productivity increases by 1.5-2 times compared with known at the time the cell group; cage for poultry [10] - improves service poultry; gutters drinking bowls for poultry [7] - improves drinking poultry; device for watering poultry conveyor cellular batteries [12] - is designed for mobile multi-cell container automated poultry; auto drinking bowls [14] - improves the drinking bird zoohygienic conditions and reduces the manual labor to cleaning drinking bowls; Hanging Wire cup drinking bowls for poultry [33]; automatic device for water [15] - provides automatic control of supply water holding tank; filter for cleaning and disinfection of air [17] - improves the quality of air purification; device for metered distribution of feed for poultry cage [32] - reduces feed costs; device for treating cellular battery [11] - improves cleaning litter from cellular batteries; cleaning litter line [22] - increases the efficiency of cleaning the litter, is reliable and easy installation; pneumatic device for collecting and transporting manure [6] - designed for the transportation of manure compressed air in a closed piping system, which greatly improves sanitation poultry enterprises; a device for collecting eggs from several layers of cellular battery [5] - reduction breaking eggs at their collection of several layers of cellular battery; method of storage of hatching eggs of poultry [35] - provides increased derivability eggs; device for sorting eggs [23] - increases the accuracy sorting eggs; installation for laying eggs laying in [21] - provides increased productivity while investing in laying eggs; device for raising poultry [8] - designed for growing birds and upload it on the conveyor belt during transport to slaughter.

Poultry XXI century

XXI century is characterized by intensive poultry industry vertical integration. In poultry egg has become the main trend of industrialization sector, including areas such as the scale of

production, use enclosed spaces with controlled microclimate. This necessitated drastic modernization and animal feed processing industry. State poultry farm originally passed into private ownership, and then, with feed mills and processing enterprises, joined the holdings. Today, the world produces 74% of poultry products using industrial systems (for comparison: in the pig - 50%, cattle - 43%) [49]. In the twenty-first century, getting eggs is one of most technologically processes in animal production with deterministic results and optimized for maximum achievement of process parameters that reduce the cost and increase the amount of profit that accelerate return on investment costs.

The feature of the modern poultry industry is the use of hybrid birds, which are produced by crossing specifically to were selected on the compound parental and maternal lines. These lines are called synthetic because they are based on 2-3 breeds of chickens. The complex of lines (2 to 4 different cross) is the cross. It is the use of crosses based nowadays egg production. Crossing to cross lines that go well together, providing a manifestation of heterosis hybrids of the first generation at 5.10% for the main economically useful traits [48].

Modern feature of the poultry breeding is a pyramid structure, vertical transmission of genetic material from breeding companies to reproductive and commodity farms. This structure provides a small share of breeding birds in total production (15-20%), which is played by intra-line breeding, and then used to obtain a special scheme for two-, three- and four-linearity hybrids. This system provides a breeding conveyor production and constant improvement of the genetic potential productivity of poultry.

The purpose of breeding to create new cross-laying hens is to increase the productivity of egg laying hens to the biological limit - one egg a day. It is important that these laying hens have high viability and long-term use in industrial production, namely until they reach at least 72-80 weeks of age [48]. To improve the efficiency of egg carries out breeding to increase egg mass (over 20 kg per laying hen). It is necessary to increase egg production and egg weight. Further selection to improve feed conversion and egg quality (shape, appearance, durability shell, taste, color yolk).

At this time, work continues to improve the technology and keeping chickens. Over the past 14 years, scientists developed a number of inventions for the improvement cage [37,41,42,45,46] and incubation [38,43] material, determine the parameters of temperature in poultry houses with floor holding chickens [39], methods of ventilation [36] aero ionization air and poultry houses [44], poultry watering systems for maintenance of cell batteries in [40], devices for transporting poultry [47].

Conclusion. With a modern point of view can be made parallel periods becoming breeding bases and processes in poultry:

- direct cooperation with academic institutions breeders (second half of the XVIII century - the first half of the XIX century) - period of intense breed formation processes active artificial incubation of eggs and machine period, which formed the main scientific basis of automation; through identification of dietary quality eggs are popular food;

- from small-scale farming to industrial complexes (second half of the XIX century - the end of the XX twentieth century) - the transition to an industrial sector, characterized by intensification of the poultry industry, the rapid development of genetics discovery heterosis effect; create cross hens based on simple lines crossed; formation and development of automation as a science, the use of mechanical and electrical systems in which automated processes such as incubation, poultry keeping and growing, watering, picking and laying eggs, veterinary and sanitary provision;

- organization of agricultural holdings (article XXI - to date) - period of intense vertical integration, industrialization sector modernization related industries; for bird eggs using a hybrid obtained by crossing synthetic lines; modern period of automation using microprocessor technology, providing automatic control and regulation control any and all processes simultaneously.

References

1.А.с. №184056. Программное устройство для задания графика светового режима в птичниках / Варнавских А. Б., Царев А.С., Курзаев И. И. - Опубл. 1966. Бюл. № 14.

2.А.с. №193214. Клеточная батарея для содержания кур-несушек ЦИИПС-КБН / Абрамова А. Г., Амелехина О. М., Березнев ВН. и др. - Опубл. 1967. Бюл. №6.

3.А.с. №271175. Регулятор влажности воздуха в камере инкубатора/ Хмырнов В. А., Широков Ю. А., Эйдис А. Л. - Опубл. 1970. Бюл. № 17.

4. А.с. №41265. Двухъярусная широкогабаритная клеточная батарея для птицы яйценоских пород / Славин Р. М., Шмидт В. Л. - Опубл.1974. Бюл. №4.

5. А.с. №641941. Устройство для сбора яиц с нескольких ярусов клеточной батареи / Пивоваров Ю. Г. - Опубл. 1979. Бюл. № 2.

6. А.с. №652065. Пневматическое устройство для уборки и транспортирования помета / Числов В. А., Наливайко И. М., Ботанин С. П. - Опубл. 1979. Бюл. № 10.

7.А.с. №685247. Желобковая поилка для домашней птицы / Мищенко В. И. - Опубл. 1979. Бюл. № 34.

8.А.с. 694156. Устройство для выращивания птицы / Сидоренко В. А., Скляр В. Т., Гусев В. А. и др. - Опубл. 1979. Бюл. № 40.

9. А.с. №728801. Групповая клетка для содержания птиц / Старчиков Н. И., Сухарев Ю. Н., Гужва В. И. и др. - Опубл. 1980. Бюл. № 15.

10. А.с. №715072. Клетка для выращивания домашней птицы / Бахтин И. А., Фисинин В. И., Новицкий Л. К. и др. - Опубл. 1980. Бюл. № 6.

11. А.с. №803919. Устройство для очистки клеточных батарей / Ивко И. И., Резниковский В. К., Крупицкий М. Я. и др. - Опубл. 1981. Бюл. № 6.

12. А.с. №810171. Устройство для поения птицы к конвейерным клеточным батареям / Костенко А. Ф., Швыдкий И. К. - Опубл. 1981. Бюл. №

9.

13. А.с. №836323. Здание для содержания животных или птиц / Гавриленко С. Н., Короткое Е. Н., Кузенков Б. А. и др. - Опубл. 1981. Бюл. № 21.

14. А.с. №865237. Автопоилка для птиц и мелких животных / Большаков Г. П. - Опубл. 1981. Бюл. № 35.

15. А.с. №869720. Автоматическое устройство для подачи воды / Тян Г.Н. - Опубл. 1981. Бюл. № 37.

16. А.с. № 873995. Устройство для поворачивания яиц в инкубаторе Буртов Ю. З., Кривопишин И. П., Голдин Ю. С. и др. - Опубл. 1981. Бюл. № 39.

17. А.с. №904745. Фильтр для очистки и обеззараживания воздуха / Оленев В. А., Зайцев А. М. - Опубл. 1982. Бюл. № 15.

18. А.с. №952179. Система управления инкубатором / Костяшкин Л. Н., Москвитин Н. Л., Соловов П. В. и др. - Опубл. 1982. Бюл. № 31.

19. А.с. №969215. Клеточная батарея для выращивания водоплавающей птицы / Березнев В. Н., Салеев П. Ф., Тардатьян Г. А. и др. - Опубл. 1982. Бюл. №40.

20. А.с. №1014550. Устройство для воздействия на эмбрионы птиц электромагнитным полем / Богатырев Н. И., Лопатченко А. В., Слепнев В.Н . - Опубл. 1983. Бюл. № 16.

21. А.с. №1024376. Установка для укладки яиц в прокладки / Макаров А. С., Чистяков И. Д. - Опубл. 1983. Бюл. № 23.

22. А.с. №1050614. Навозоуборочный конвейер / Фельдман М. С., Румковский Г. П., Калинин О. П. - Опубл. 1983. Бюл. № 40.

23. А.с. №1055451. Устройство для сортировки яиц / Макаров А. С. - Опубл. 1983. Бюл. № 43.

24. А.с. №1069740. Клеточная батарея для содержания птицы и мелких животных / Резниковский В. К., Марков Ю. М. - Опубл. 1984. Бюл. № 4.

25. А.с. №1064929. Автоматическая система контроля работы

инкубаторов / Костяшкин Л. Н., Москвитин Н. Л., Богданов А. П. - Опубл. 1984. Бюл. № 12.

26. А.с. 1120947. Инкубатор / Ильяшенко В. В., Молотков Б. В., Чупахин И. Ф. и др. - Опубл. 1984. Бюл.40.

27. Гордеева Т. Тенденции мирового племенного птицеводства / Т. Гордеева // Птицеводство. - 2012. -№9 - С. 11-14.

28. Моисеева И. Г. Происхождение и эволюция домашних кур / И. Г. Моисеева, М. Г. Лисичкина // Природа. - 1996. - Т.5. - С. 88-96.

29. Настольная книга птицевода Императорского Русского общества птицеводов. - Санкт-Петербург, 1905 - 140 с.

30. Никитин Н. Выставки птицеводства в дореволюционной России / Н. Никитин // Птицеводство. - 1992 - №5. - С.23-27.

31. Осадча Ю. В. Яєчні кури: історія приручення, породоутворювальний процес, спеціалізація / Ю. В. Осадча // Науковий вісник Національного університету біоресурсів і природокористування України, 2014. - Вип. 190. - С. 341-356.

32. Пат. 6539 Спосіб дозованої роздачі корму при клітковому утриманні птиці / Нарушин В. Г. - Опубл. 1994. Бюл. № 8.

33. Пат. 13150 Підвісна чашкова напувалка для птиці / Микиша М. Т. - Опубл. 1997. Бюл. № 1.

34. Пат. 15258 А. Пристрій для регулювання світлового режиму в птахівничих приміщеннях / Герасимчук Ю. В. - Опубл. 1997. Бюл. №

35. Пат. 25688 А. Спосіб зберігання інкубаційних яєць сільськогосподарської птиці / Якименко І. Л. - Опубл. 1998. Бюл. № 1.

36. Пат. 41923 Вентиляційна стрічка / Лафарж Б. Р.- Опубл. 2001. Бюл. №9.

37. Пат. 42538 А. Кліткова батарея для вирощування молодняка птиці та дрібних сільськогосподарських тварин / Кравців Р. И. - Опубл. 2001. Бюл. №9.

38. Пат. 63504 А. Спосіб і установка для інкубації яєць птиці /

Лисиченко М. Л. - Опубл. 2004. Бюл. № 1.

39. Пат. 12500 Спосіб визначення параметрів температури в пташнику з підлоговим утриманням / Лисенко В. П. - Опубл. 2006. Бюл. № 2.

40. Пат. 25224 Система напування птиці за умов утримання в кліткових батареях / Ревенко І. І. - Опубл. 2007. Бюл. №11.

41. Пат. 60561 Кліткове обладнання для утримання батьківського поголів'я курей / Зора В. Б. - Опубл. 2011. Бюл. № 12.

42. Пат. 84224 Батарея кліткова для групового утримання тварин / Івко І. І. - Опубл. 2008. Бюл. № 18.

43. Пат. Спосіб гідравлічної орієнтації яєць та їх укладання в комірки лотка / Шведик М. С. - Опубл. 2010. Бюл. № 15.

44. Пат. 56137 Спосіб аероіонізації повітря пташників / Газзаеві Л. В. - Опубл. 2011. Бюл. № 1.

45. Пат. 97193 Спосіб утримання птиці та пристрій для його виконання / Вайспапір І. Б. - Опубл. 2012. Бюл. № 1.

46. Пат. 100454 Кліткова батарея / Ткач В. В. - Опубл. 2012. Бюл. № 24.

47. Пат. 104191 Пристрій для транспортування живої свійської птиці на борту вантажної машини / Дзюатті М. - Опубл. 2014. Бюл. № 1.

48. Селекція сільськогосподарських тварин / Ю. Ф. Мельник, В. П. Коваленко, А. М. Угнівенко та ін. [За заг. ред. Ю. Ф. Мельника, В. П. Коваленка та А. М. Угнівенка]. - К.: «Інтас», 2008. - 445 с.: 28 іл.

49. Трусов Ю. В. Оптимизиция управленчиских решений в яичном птицеводстве в условиях кризиса / Ю. В. Трусов, Суровцев В. Н., Частикова Е. Н. // Птица и птицепродукты. - 2009. - № 4. - С.27-31.

50. Abasht B. Extent and consistency of linkage disequilibrium and identification of DNA markers for production and egg quality traits in commercial layer chicken populations / B. Abasht, E. Sandford, J. Arango and ath.// BMC Genomics. - 2009. - Vol. 10. - P. 2.

51. An Kaam J.B.C.H.M. Whole genome scan in chickens for quantitative trait loci affecting body weight in chickens using a three generation design / An

Kaam J.B.C.H.M. etc. // Livest Prod Sci. - 1998. - Vol. 54. - P. 133-150.

52. Astill G. The countryside of medieval England / G. Astill, A. Grant. - Oxford, 1988. - 314 p.

53. Buitenhuis A. J. Identification of quantitative trait loci for receiving pecks in young and adult laying hens / A. J. Buitenhuis etc. // Poult Sci. - 2003.- Vol. 82.-P. 1661-1667.

54. Bumstead N. A preliminary linkage map of the chicken genome / N. Bumstead etc. // Genomics. - 1992. - Vol. 13. - P. 690-697.

55. Deeb N. Use of a novel outbred by inbred Fl cross to detect genetic markers for growth / N. Deeb etc. //Anim Genet. - 2003. - Vol. 34. - P. 205-212.

56. De Koning D-J. Segregation of QTL for production traits in commercial meat-type chickens / D-J. De Koning etc. // Anim Genet. - 2004. - V. 83.-P. 211-220.

57. De Oliveira Peixoto J. Influence of the A286G polymorphism in the lepr gene on carcass traits in a paternal broiler line /J. de Oliveira Peixoto, E. Peri, A. Coidebella etc. // Worlds Poultry Science Journal. - 2012. - P. 425-428.

58. FAWC. Report on laying hens in colony systems. - London: MAFF publications, 1991. - 785 p.

59. Grisart B. Positional candidate cloning of a QTL in dairy cattle: identification of a missence mutations in the bovine DGAT1 gene with major effect on milk yield and composition / B. Grisart etc. // Genome Research. - 2002. - Vol. 12. - P. 222-231.

60. Groenen MAM. QTL mapping in chicken using a three generation full sib family structure of an extreme broiler broiler cross / MAM. Groenen // Anim Biotechnol. - 1997. - Vol. 8. - P. 41-46.

61. Honkatukia M. Mapping of QTL affecting incidence of blood and meat inclusions in egg layers / M. Honkatukia, M. Tuiskula-Haavistol, V. Ahola // BMC Genetics . - 2011. - http://www.biomedcentral.com/1471-2156/12/55

62.Ikeobi C. O. Quantitative trait loci affecting fatness in the chicken / C. O. Ikeobi etc. // Anim Genet. - 2002. - Vol. 33. - P, 428-435.

63. Jennen D. G. J. Detection and localization of quantitative trait loci affecting fatness in broilers / D. G. J. Jennen etc.// Poilflt Sci. - 2004. – Vol. 83. - P. 295-301.

64. Jonchere V. Gene expression profiling to identify eggshell proteins involved in physical defense of the chicken egg / V. Jonchere, C Hennequet-Antier, C Cabau // BMC Genomics. - 2010. - Vol. 21. - P. 11-57.

65. Kaiser M. G. Microsatellite markers linked to Salmonella enterica serovar enteritidis vaccine response in young F l broiler-cross chicks / M. G. Kaiseretc // Poult Sci. - 2002. - Vol. 81. - P. 193-201.

66. Lamont S. J. Genetic markers linked to quantitative traits in poultry / S. J. Lamont etc. // Anim Genet. - 1996. - Vol. 27. - P. 1-8.

67. Lipkin E. Quantitative trait locus mapping in chickens by selective DNA pooling with dinucleotide microsatellite.markers by using purified DNA and fresh or frozen red blood cells as applied to marker-assisted selection / E. Lipkin etc. // Poult Sci. - 2002. - Vol. 81. - P. 283-292.

68. Liu W. Construction and characterization of a novel 13.34-fold chicken bacterial artificial chromosome library / W. Liu etc. // Anim Biotechnol. - 2003. - Vol. 14. - P.145-153.

69. Liu W. A genome-wide SNP scan reveals novel loci for egg production and quality traits in white leghorn and browngc dwarf layers / W. Liu etc. // PloS one. - 2011. - Vol. 6. - P. 268-274.

70. McGee H. On food and cooking / H. McGee. - New York, 1984. - 269 p.

71. Nishi Y. Can fowls fly hundreds of miles over the Himalayas? / Y. Nishi, T. Sakiyama, A. Sato // Asian languages and general linguistics. -1990.-P. 55-77.

72. Sasaki O. Genetic mapping of quantitative trait loci affecting body weight, egg character and egg production in F2 intercross chickens / O. Sasaki etc. // Anim Genet. - 2004. - Vol. 35. - P. 188-194.

73. Sazanov A. A. Chromosomal localization of fifteen large insert BAC clones containing three microsatellites on chicken chromosome 4 (GGA4) which

refine its centromere position / A. A. Sazanov etc. //Anim Genet. -2005. - Vol. 36. - P. 161-163.

74. Schmid M. Second report on chicken genes and chromosomes / M. Schmid etc. // Cytogenet Genome Res. - 2005. - Vol. 109. - P. 415-479.

75. Sewalem A. etc. Mapping of quantitative trait loci for body weight at three, six, and nine weeks of age in a broiler layer cross / A. Sewalem etc. // Poult Sci. - 2002. - Vol. 81. - P. 1775-1781.

76. Somes R.G. International registry of poultry genetic stocks / R. G. Somes. - Exp.Stat.Bull.Conn., 1985. - 469 p.

77. Stewart M. W. Profitable poultry keeping / M. W. Stewart. - Christchurch: Whitcombe & Tombs, 1958. - 248 p.

78. Stromberg L. Poultry of the World / L. Stromberg. - 1996. – 516 p.

79. Smith P. The chicken book / P. Smith, D. Charles. - San Francisco, 1982. – 458 p.

80. Tannahill R. Food in history / R. Tannahill. - New York, 1989. – 562 p.

81 Tanner R. Life Sciences Librarian / R. Tanner. - Arizona State University, 1959. -452 p.

82. Tatsuda K. Genetic mapping of QTL affecting body weight in chickens using a F2 family / K. Tatsuda etc. // Br Poult Sci. - 2001. - Vol. 42. - P. 333-337.

83. Toussaint-Samat M. A history of food, trans. Anthea Bell / M. Toussaint-Samat. - Cambridge, Mass, 1992. – 789 p.

84. Trager J. The food chronology / J. Trager- New York, 1995. – 854 p.

85. Tuiskula-Haavisto M. Mapping of quantitative trait loci affecting quality and production traits in eggs layers / M. Tuiskula-Haavisto etc. // Poultry Sci. - 2002. - Vol. 81. - P. 919-927.

86. Tuiskula-Haavisto M. Quantitative trait loci affecting eggshell traits in an F2 population / M. Tuiskula-Haavisto, H. Honkatukia, R. Preisinger etc.//Animal Genetics.-2011. –Vol. 42.-T. 3. - P. 293-299.

87. Vallejo R.L. Genetic mapping of quantitative trait loci affecting susceptibility to Marek's disease virus induced tumors in F2 intercross chickens /

R.L. Vallejo etc. // Genetics. - 1998, - Vol. 148. - P. 349-360.

88. Van Kaam J. B. C. H. M. Whole genome scan in chickens for quantitative trait loci affecting growth and feed efficiency / J. B. C. H. M. Van Kaam etc. // Poult Sci. - 1999. - Vol. 78. - P. 15-23.

89. Van Kaam J. B. C. H. M. Whole genome scan in chickens for quantitative trait loci affecting carcass traits / J. B. C. H. M. Van Kaam etc. // Poult Sci. - 1999. - Vol. 78. -P. 1091-1099.

90. Wandelt R. Handbuch der Nuhnerrassen die Huhnerrasscn der Welt / R. Wandelt, J. Wolters // Verlag Wolters, 1996. – 258 p.

91. Wardecka B. Relationship between microsatellite marker alleles on chromosome 1-5 originating from the Rhode Island Red and green-legged Partrigenous breeds and egg production and quality traits in F2 mapping population / B. Wardecka etc.// J. Appl. Genet. - 2002. - Vol. 43. - P 319-329.

92. Wood-Gush D. G. M. A history of the domestic chicken from antiquity to the 19th century / D. G. M. Wood-Gusf // Poultry Science -1959.-Vol. 38.-P. 321-326.

93. Xu G. A CT repeat in the promoter of the chicken malic enzyme gene is essential for function at an alternative transcription start site / G. Xu etc. // Arch Biochem Biophys. - 1998. - Vol. 358. - P. 83-91.

94. Yonash N. High resolution mapping and identification of new quantitative trait loci (QTL) affecting susceptibility to Marek's disease / N. Yonash etc.//Anim Genet. - 1999.-Vol. 30.-P. 126-135.

95. Zengrong Z. Polymorfism of calpastatin (CAST) gene and its association with chicken carcass traits / Z. Zengrong, D. Huarui, W. Zhaojun // Worlds Poultry Science Journal. - 2012. - P. 412-419.

96. Zhou H. Genetic markers associated with antibody response kinetics in adult chickens / H. Zhou etc. // Poult Sci - 2003 – Vol. 82 – P. 699-708.