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**«Genetic Parameters of productivity and exterior traits of dairy cattle»**

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# Problem statement

# Research tasks

- We are aware of the biological regularities of growth, development, and exterior type formation as well as other biological traits of animals, we could be able to assess correctly and forecast milk yield, reproduction potential, and selection progress.
- The aim of the scientific research was to study the regularity of phenotypic traits development for dairy cows genetic potential fulfilment at various conditions of use.
- Determination of the exterior parameters of cows of different genealogical origin by processing the 3D solid mathematical models of a cow conformation plotted using the images and depth maps obtained by Structure Sensor 3D.
- Evaluation of the milk production of cows and identification of factors affecting productivity and exterior.
- The genetic selection parameters of the cow exterior traits and milk yield were calculated.

# Analysis of breeding-genetic and productive traits of dairy cattle

The scientific experimental researches were based on the Kholmogory and the Black-and-White cows bred. Cows sampled population was equal to **355** specimens.

- The cows of JSC “Uchkhoz “Iulskoe” of Izhevsk State Academy of Agricultural Sciences are characterized by more compact constitution with heavy chest and pelvis as compared to the dairy cattle of Rossia, LLC, Mozhga District. They had greater values of such measurements as the withers height **by 2.3%**, the Pelvic arch length **by 4.9%**, the chest width **by 6.7%**, however, the slope body length was less **by 2.5%**. Among the Kholmogory population, more compact specimens were detected in the dairy cattle herd of Put Ilich, JSC, Zavialovo District, and, as compared to those of SPK “Chutyrskii”, Igra District, they had greater values of such measurements as the Pelvic arch length **by 3.7%**, the chest width **by 4.3%**, having truly less value of the slope body length **(by 4.5%)**.
- No significant difference was detected in the course of the analysis of dependence between the cow exterior traits and their linear origin, however, truly wide hip width was observed for the cattle of the Wes Back Ideal line. They outdid the cattle of the Montvic Chieftain line **by 5.3%** and the cattle of the Reflection Sovereign line **by 2.9%**.
- The Kholmogory cows reliably leave the Black-and-White cows behind in terms of the milk yield, which is **1087.53 kg (by 18%)** higher, but are inferior, **by 0.16%**, in terms of fat content of milk with minor difference **(by 0.05%)** in protein content of milk.
- Milk-yield values of cows of different linear origin give the evidence of unreliable difference both in terms of milk yield **(by 1.6-2.1%)** and fat **(by 0.02-0.03%)** and protein **(by 0.02-0.03%)** content of milk.

# Univariate analysis of variance of research results

Univariate analysis of variance of research results.				
Performance indicator	“Environment” factor influence, $\eta_x^2$	P	“Line” factor influence, $\eta_x^2$	P
Body built index	0.013 ±0.008	More than 0.05	0.302±0.004	0.01
Height at withers	0.044±0.008	0.01	0.334±0.004	0.01
Chest width	0.163±0.007	0.01	0.298±0.004	0.01
Chest depth	0.063±0.008	0.01	0.337±0.004	0.01
Body length	0.120±0.008	0.01	0.334±0.004	0.01
Rump width	0.273±0.004	0.01	0.244±0.004	0.01
Rump length	0.115±0.008	0.01	0.316±0.004	0.01
Metacarpus girth	0.066±0.008	0.01	0.306±0.004	0.01
Milk yield for lactation	0.191±0.007	0.01	0.273±0.004	0.01
Mass fraction of fat	0.344±0.004	0.01	0.269±0.004	0.01
Mass fraction of protein	0.099±0.008	More than 0.05	0.291±0.004	0.01
Productivity index	0.184±0.007	0.01	0.279±0.004	0.01

- The “Environment” factor demonstrated significant influence on fat content of milk (**34.4%**), the hip width (**27.3%**), milk yield during the lactation cycle (**19.1%**), the productivity index (**18.4%**), and the width of chest (**16.3%**).
- The “Line” factor power was high enough and varied between **24.4** and **33.4%**.
- It was determined that the “Line” factor substantially influenced on the parameters characterizing an individual group of the phenotypic traits as a whole, such as the constitution index (**30.2%**) and the productivity index (**27.9%**).

- The use of digital technologies and processing the 3D solid mathematical models of a cow conformation plotted using the images and depth maps obtained by Structure Sensor 3D allows us to evaluate in an accelerated mode the exterior parameters of animals of a sufficiently large population. Body parameters in numerical terms showed a high level of reliability and objectivity in assessing the exterior of animals.
- The analysis of variance demonstrated, with high confidence level, that linear origin had influence on milk productivity and the cow conformation.

## CONTACTS

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