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Database Of Pedigree And Zootechnical Registration Of Dairy Goats Productivity.

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ABSTRACT

The use of information systems in animal husbandry is an urgent task. Growing livestock of animals requires proper breeding and zootechnical accounting, which is very difficult to ensure without the use of modern information processing methods. At present, the line of information systems is poorly represented in dairy goat breeding. It is proposed to develop such a system, which would take into account the data on the assessment of dairy goats. In addition, such a system should automatically determine the class of a particular animal according to the data of the test. The core of any information system is a database. The paper deals with the creation of a logical database model used in the animal accounting information system. Analyzed the subject area of dairy goat. Selected database entities. Groups of animals are separated by gender. Also indicated is the belonging of each animal to a certain age group. The set of attributes for each entity is defined, which will characterize the whole range of animals counted. The relationships between the entities were established and the model was normalized. The design used technology IDEF1X. As a result, a complete attribute model of the database was obtained, which includes all the entities and attributes identified in the process of researching the subject area. Key attributes represented by primary and foreign keys are defined. The presented model took into account the position that each animal during its life can migrate from one age group to another. Therefore, there is a need to store in the database the most complete information about the animal since its birth. The data stored in the database will be the basis for calculating the breeding value of each animal. The developed logical model is the basis for creating a physical database model focused on a specific database management system.

Keywords: database, primary key, foreign key, entity, attribute, connection, goat breeding, logical model, zootechnical accounting.

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INTRODUCTION

Modern information technologies have been applied in almost all sectors of the economy. Obviously, with their success, domestic agriculture is not least due to the use of advanced methods, including the widespread use of information systems. For any branch of animal husbandry, selection work is a priority task [1–4, 9-11]. The use of information technology in such work will make it possible to use mathematical methods for collecting, storing, accumulating and analyzing genetic information, technical information about animal habitat conditions. In the North Caucasus Federal Scientific Agrarian Center (Mikhailovsk) an information and computing system (IVS) for pedigree and zootechnical accounting in dairy goat breeding is being developed. This system, using complete data on the assessment of breeding goats of the dairy direction [3, 4, 8], will allow an assessment and prediction of animal productivity.

The core of any information system, as a rule, is a database (DB) containing complete and consistent information about all objects of the subject area under study [1, 5, 6]. The subject area of this database will be the livestock of dairy goats, goats and their descendants. It is assumed that all the information necessary for calculating the breeding value of animals will be entered into this database, and then issued to the calculation modules at the request of the ITT. Therefore, it is necessary to have as complete a set of data as possible for each animal.

MATERIAL AND METHODS

When designing the database, the IDEF1X methodology was used. According to this methodology, the entities included in the database, their attributes, primary (PK) and foreign keys (FK) keys, relations between entities [6, 7] were defined.

RESULTS AND DISCUSSION

Analysis of the subject area allowed us to identify the entities and attributes that will be included in the designed database, as well as the data type of the attributes. The primary key in each entity is labeled PK, the foreign keys for communicating with other entities are labeled FK. The first two entities “The Male Goat” and “The Female Goat” have both a number of identical and individual attributes inherent only to them. For the “The Male Goat” entity, such attributes are data about daughters. The essence of "The Female Goat" has unique attributes that characterize the quality of the udder (table 1). Obviously, the attribute set for the entities “The Female Goat” and “The Male Goat”, shown in Table 1, is not final and can be added.

It should be remembered that data on their daughters is necessary to assess the breeding value of goat producers. Therefore, it makes sense to highlight the new entity “Daughter”. It is necessary to take into account that both a goat and a goat can be either parents of animals whose data are in the database, or their descendants. Therefore, it is necessary to separate the entities: “Father”, “Mother”, “The origin of the animal”.

Table 1: Entity Attributes "The Male Goat" and "The Female Goat"

Essence	Attribute	Data type
The Male Goat / The Female Goat	Individual number (PK)	Numerical
	Assignment (PK)	Text
	Breed (FK)	Text
	Line	Text
	Place of Birth	Text
	Date of Birth	Date Time
	Birth Type (FK)	Text
	Live weight at birth	Numerical
	Live weight in 2 months	Numerical
	Live weight at 7 months	Numerical
	Live weight at 12 months	Numerical
	Live weight at 18 months	Numerical
	Live weight at 30 months	Numerical

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	Live weight at 3 years	Numerical
	Body type	Numerical
	Torso volume	Numerical
The Male Goat	Number of single daughters	Numerical
	Number of twin daughters	Numerical
	The number of daughters is triple	Numerical
The Female Goat	Udder support	Numerical
	Udder Front	Numerical
	Udder back	Numerical
	General view and location of the udder	Numerical
	Nipples	Numerical

Since the assessment of each animal must take into account its type of birth, it makes sense to select the essence of “Type of birth”. The attributes of these entities are shown in table 2.

Since the database should store data that will later be used for breeding evaluation, the following entities are required to be entered.

Entity "Minimum weight requirements". Here, the primary key is the “Breed of animal” attribute. The remaining attributes represent the minimum mass requirements for each of the dairy goat breeds. At the same time, data separation for goats and goats is necessary. This entity will be connected to the entities “The Male Goat” and “The Female Goat” by one-to-many connections through the foreign key “Breed of animal”.

Table 2: Attributes of the entities “Father”, “Mother”, “Daughter”, “The origin of the animal”, “Breed of animal”

Essence	Attribute	Data type
Father	Individual Father Number (PK)	Numerical
	Breed	Text
	Tribal value	Text
Mother	Individual Mother Number (PK)	Numerical
	Breed	Text
	Lactation number	Numerical
Daughter	Individual daughter number (PK)	Numerical
	Individual Father's Number (FK)	Numerical
	Father's Assignment (FK)	Text
	Type of birth	Numerical
	Body type	Numerical
	Individual mother number	Numerical
The origin of the animal	Individual number (PK)	Numerical
	Assignment (PK)	Text
	Individual Father's Number (FK)	Numerical
	Individual Mother Number (FK)	Numerical
Breed of animal	Birth Type (PK))	Text
	Comprehensive Score	Numerical

The essence of "Milk productivity". The primary key is the attribute “Individual No. of mother goat”. The foreign key is the “Breed of animal” attribute. The remaining attributes include data on the year of each lactation, the number of milk days in each lactation, the maximum milk yield, the fat and protein content in milk in each lactation.

The essence of "Minimum requirements for milk production". The key attribute is “Breed of animal”. The remaining attributes should include requirements for milk yield, fat mass in milk, protein mass in milk separately for the 1st, 2nd and 3rd lactation. This entity is the main one in relation to the “Milk productivity”

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and “The Female Goat” entities and is connected with them by one-to-many connections through the “Breed of animal” field.

The general view of the logical model of the database is presented in Figure 1. This figure shows all the identified entities and key attributes, both primary (PK) and external (FK). It is worth noting that there is a one-to-one relationship between the entities “The Male Goat” and “The origin of the animal” through the key fields “Individual No.” and “Destination”. The same type of communication through the fields of the same name exists between the entities “The Female Goat” and “The origin of the animal”.

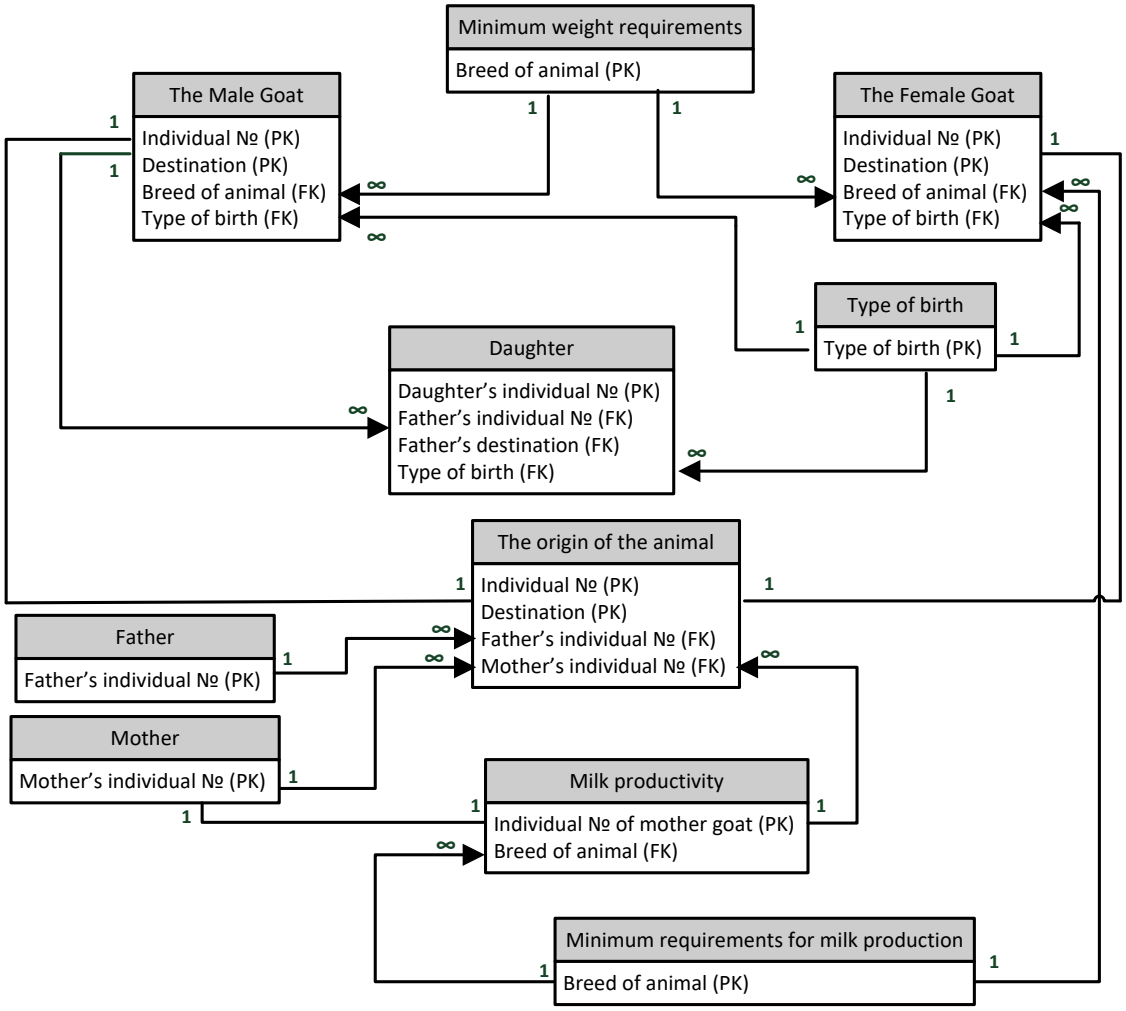

Figure 1: Logical Database Model

Also, the type of one-to-one relationship takes place between the entities “Mother” and “Milk productivity”. Communication is carried out through key data fields of entities. The remaining links in this model are of the type “one to many”.

CONCLUSION

The analysis of the subject area allowed us to identify 10 entities. Such a structure of the database will allow to take into account the data on the assessment and trace the genealogy of animals. Also, the availability of complete data will allow to generate reports for the exchange of information between laboratories, government agencies and other organizations using modern information technology. Also, this model allows you to supplement the database with computed fields that allow you to perform calculations related to determining the breeding value of animals [1].

The presented logical model of the database is universal and is in no way connected with a specific implementation of a database management system (DBMS). This model includes all entities of the subject area, all attributes and is the most detailed representation of the data structure. The data are presented in the third normal form, therefore, it can be said that the presented model is a full attribute model.

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