

FORMATION OF PHENOTYPICAL FEATURES OF BULLS OF IMPORTED MEAT BREEDS OF DIFFERENT ECOLOGICAL AND GENETIC ORIGIN IN THE STEPPE OF UKRAINE

V. S. Kozyr

State Enterprise Institute of Grain Crops of NAAS, 14 Volodymyr Vernadskyi Str., Dnipro, 49009, Ukraine

To studied the meat productivity of bulls of Men-Anjou, Kian and Santa Gertrude breeds in the Experimental Farm "Polyvanivka" of SE Institute of Grain Crops of NAAS. Growing condition, keeping technology, level of feeding were the same. Up to 18 months, animals were kept loose, and later – on a leash. The diet was balanced according to the norm of A-UIL traditional forages for Steppe zone. Animals were slaughtered at 18, 24 and 30 months of age by 5 bulls from each group. The studies used zootechnical, biological, analytical, biochemical, morphological, biometric methods.

It is proved that in order to make more efficient use of livestock and obtain high-quality competitive beef to improve the supply of meat to the population, it is advisable to grow bulls up to 2.5 years of age. At the same time, clinical indicators and indicators of animals' blood biochemistry were normal. In terms of growth energy and feed conversion at all ages, Men-Anjou dominates, bulls reach a weight of 600 kg (or more) earlier than other peers due to the massiveness and habitus of their body, they have a greater mass of carcasses, internal fat, offal and skin, resulting in higher slaughter yield. The differences in the coefficient of meat, chemical composition of beef, and its culinary and taste qualities are insignificant. Under the conditions of the Ukrainian steppe, bulls of Men-Anjou, Kian and Santa Gertrude breeds showed productive and slaughter qualities characteristic of their genotypes during the formation of phenotypic traits. Imported breeds can be a source of genetic diversity in the development of beef cattle breeding in Ukraine.

The beef of all studied bulls' breeds meets is in a widely commercial demand. These breed of bulls steady pass on their positive traits to offspring, which can be used in the formation of Beef Cattle Breeding in Ukraine. Raising animals of the Men-Anjou, Kian and Santa Gertrude breeds up to 2.5 years of age will increase the production of high-quality beef in order to improve the supply of meat to the population and strengthen the country's food security.

Key words: *beef cattle, age, growth energy, live weight, slaughter indicators, quality, feed conversion.*

The demand for beef in Ukraine is significantly ahead of its production. Its per capita consumption is several times lower than the medical norm, and according to this indicator it even lags behind the underdeveloped countries. In addition, its prime cost is much higher than the selling price, which leads to the unprofitable industry. This is a very alarming signal that worsens people's health and social well-being. Therefore, one of the main tasks for all government bodies, public organizations and agricultural formations is to create such conditions for meat producers and processors to ensure food and economic security of the state.

Currently, the main supplier of beef is dairy farming. It is practically impossible to improve the situation without specialized cattle breeding, especially in terms of meat quality [1]. At the same time, a number of domestic beef

cattle breeds have already been created. In the breed formation process was also used imported livestock. However, its tests in the conditions of the steppe zone have not been carried out enough. Therefore, we believe that our research is relevant.

They will help scientists and practitioners to make fuller use of the possibilities of imported breeds in improve nutrition, strengthen health and increase the material well-being of breeding work, the results of which will Ukrainians.

Aim of the study. Study of the peculiarities of the formation of meat productivity, clinical indicators and indicators of blood biochemistry of imported breeds in the age aspect research materials and methods, research results became a breed. Cattle are white, the coat of the end of the tail, the prepuncial sac, the lower part of the scrotum and udder, near

Author information:

Kozyr Volodymyr Semenovych, *doctor of agricultural sciences, professor, shief reasecher of the lab. animal husbandry*, e-mail: izkzoo3337@gmail.com, <http://orcid.org/0000-0002-5881-4440>

the eyes, and in the producers the front part of the body, have a whitish tint

Materials and methods. To study the meat productivity of bulls of imported specialized meat breeds Men-Anjou, Kian, Santa-Gertrude, we formed them in groups of 15 heads. Growing conditions, keeping technology, level of feeding were the same. Until 18 months the animals were kept loose, and later – on a leash. The ration was balanced according to the standards of the AUIL with traditional forages for the steppe zone [2, 3]. They used zootechnical, biological, analytical, biochemical, morphological, biometric methods.

Results and discussion. First of all, we studied the origin, purpose and conditions of creation, breed characteristics of the breeds that are bred in different ecological and climatic areas.

Men-anjou is one of the largest long-growing beef breeds of cattle in terms of live weight, body length and height. The physique is harmonious, the temperament is calm (phlegmatic). It was created in the north-west of France in a temperate continental climate by the method of long-term targeted selection and breeding of massive local livestock offspring. It was brought to Ukraine from Belarus in the second half of the XX century.

The genealogical structure was formed at the expense of 4 animal lines – Dolby, Paver, Nino and Upleit. In terms of the composition of carcasses, animals are close to charolais. The disadvantages include the increased frequency of difficult calving. Cows have high maternal qualities and reproductive ability.

The ancient Kian cattle breed was bred in the Kian Valley of Italy, where the climate is mild and there is enough feed. In the beginning they were used as working animals. Then the method of selection, highlighting the livestock with well-developed muscles, formed a meat type of animals, which later.

The darker tips of the horns and the hoof horn, the nasal mirror, the upper part of the tongue, the palate, the eyelids, near the anal opening, and in cows and the labia. Kianas are long-growing, long, high-legged, in Ukraine in the 60-s of the XX century they were used in the breed-forming process during the breeding of the first national Ukrainian meat breed and in industrial crossing with zoned dairy and combined breeds.

The Kians have a small head, the back and loin are even and wide, the withers rise somewhat above the upper line of the body, the back is long and even, the chest is wide and deep. They have thin, but very strong bones, thin and elastic skin. Compared to other studied breeds, animals show an increased temperament, which is the main reason for the refusal of practitioners to use them. They strike with lightning speed with horns, front and hind legs (forward, backward and to the side), bite, press the fallen person with their foreheads to the ground and trample with their feet, jump over a hedge up to 2 m high. However, when breeding new beef cattle breeds, their positive qualities should be used.

The meat breed Santa-Gertrude was created in the early XX century in the US state of Texas in a dry, harsh climate by breeding "in itself" crossbreeds obtained from crossing Zebu bulls with Shorthorn cows. The animals are long, but medium in height, hardy, hornless, they have a reduced sensitivity to blood-sucking insects, they make good use of pasture with such coarse vegetation as reeds and sedges. The color is red.

A characteristic feature is a tubercle at the withers and drooping ears with the auricles turned forward (like a zebu), bulls have a large pendulous fold of the preputial sac, and heifers have a skin fold on the umbilical cord. They steadily transmit these traits to their offspring. They were brought to Ukraine from Kazakhstan in the 60-s of the last century.

For various reasons, these meat breeds have not found particularly wide distribution in Ukraine. At the same time, even at the same time, they left a deep trace in the breed-forming process of Ukraine when creating Ukrainian meat, Simmental meat, Askanian (southern) meat breeds [4].

A common feature of the studied gobies was normal acclimatization to the dry hot climate of the Ukrainian steppe and adaptation to feeding conditions. The feed intake was high (97–98 %). They showed good growth vigor typical of the classic Franco-Italian breeds (Table 1).

The shorter the time to reach a certain live weight, the more economical the production of beef [5, 6]. Gobies of the studied breeds spent a different amount of time to achieve the realiza-

Table 1. Age dynamics of live weight of animals, $X \pm Sx$

Live weight, kg	Breed		
	Men-Anjou	Kian	Santa-Gertrude
Bulls at birth	47 $\pm$ 4,5	58 $\pm$ 5,0	30,5 $\pm$ 3,11
at 12 months	398 $\pm$ 7,3	369 $\pm$ 9,7	308,4 $\pm$ 6,28
at 18 months	579 $\pm$ 8,7	553 $\pm$ 11,5	424,3 $\pm$ 7,36
at 24 months	723 $\pm$ 12,1	576 $\pm$ 14,8	548,8 $\pm$ 15,21
at 30 months	811 $\pm$ 17,0	724 $\pm$ 13,3	627,5 $\pm$ 9,42
Full age bulls	4	1109 $\pm$ 11,7	1002,7 $\pm$ 12,38
Heifer at birth	41 $\pm$ 2,6	48 $\pm$ 3,2	27,7 $\pm$ 2,22
at 12 months	329 $\pm$ 6,2	341 $\pm$ 5,0	294,6 $\pm$ 3,45
at 18 months	474 $\pm$ 9,9	417 $\pm$ 9,2	381,8 $\pm$ 6,37
at 24 months	566 $\pm$ 11,3	529 $\pm$ 12,9	493,4 $\pm$ 13,36
at 30 months	630 $\pm$ 10,5	618 $\pm$ 16,7	527,9 $\pm$ 15,24
Full-age cows	741,4 $\pm$ 8,24	694,0 $\pm$ 12,49	630,7 $\pm$ 16,39
Average daily gains up to 18 months, g			
Bulls	1005 $\pm$ 3,0	1002 $\pm$ 3,4	789 $\pm$ 7,1
Heifers	884 $\pm$ 2,7	778 $\pm$ 1,9	702 $\pm$ 4,2

ble condition (Table 2). It is quite natural that with an increase in live weight, the habit of animals increased up to 2.5 years of age, which indicates the long growth of the breeds [7]

Table 2. Age of bulls upon reaching a certain mass, days, $X \pm Sx$

Live weight, kg	Breed					
	Men-Anjou		Kian		Santa-Gertrude	
	Bulls	Heifers	Bulls	Heifers	Bulls	Heifers
300	269,0 $\pm$ 6,32	324,2 $\pm$ 5,01	291,2 $\pm$ 4,75	384,0 $\pm$ 2,75	359,0 $\pm$ 4,44	431,2 $\pm$ 5,55
400	368,4 $\pm$ 7,11	455,3 $\pm$ 8,23	383,4 $\pm$ 8,11	518,3 $\pm$ 4,55	441,21 $\pm$ 2,89	574,3 $\pm$ 6,74
500	469,6 $\pm$ 9,25	601,8 $\pm$ 10,47	474,6 $\pm$ 4,21	649,5 $\pm$ 2,77	602,22 $\pm$ 1,78	710,4 $\pm$ 7,12
600 and more	577,8 $\pm$ 12,12	825,7 $\pm$ 14,12	581,7 $\pm$ 3,75	781,2 $\pm$ 4,21	766,31 $\pm$ 3,37	859,8 $\pm$ 8,41

(Table 3).

All studied breeds have a wide and deep chest, a well-developed back of the body. In terms of height at the withers and length of the body, the men-anjou gobies dominated in all periods of life. Compared to others, the Santa Gertrude breed was smaller, the Kian bulls and heifers occupied an average position.

The situation is similar in terms of slaughter indicators (Table 4). At the same time, there was a lot in common. The output of the steamed carcass was 56-58%, internal fat - 4-5%. The proportion of pulp in the carcass with age, albeit unnoticeably, but increased to 82-84 %, and bones decreased from 17 to 16%. According to the coefficient of meat content, all the experimental animals confirmed its value, as in their homeland – there were 5.5–5.5 kg of muscle tissue per 1 kg of bones. By weight, the

skins of gobies were classified as heavy (over 25 kg), their yield was 10-11%, and in length, width and thickness they corresponded to GOST of the tanning industry. The quantity and quality of the first and second category by-products met the requirements of the meat processing industry.

Despite the fact that with age, the slaughter indicators of all bulls and the physical and technical properties of meat throughout the experiment, they remained high. Even with an increase in the mass and specific gravity of fat in the average sample of meat, according to the trade classification, beef was considered lean, the ratio "fat: protein" was stable, in all experimental animals it was 2:1. The protein-quality indicator (the ratio of tryptophan amino acids to hydroxyproline) was also optimal.

An important indicator of the quality of

Table 3. Measure build of body of bulls by rearing periods, $\bar{X} \pm S_x$

Dimensions of bulls	Breed		
	Men-Anjou	Kian	Santa-Gertrude
Height at the withers, cm			
Bulls at 12 months	123,0 $\pm$ 2,11	116,5 $\pm$ 2,14	112,3 $\pm$ 1,24
at 18 months	137,4 $\pm$ 1,17	124,0 $\pm$ 7,08	115,4 $\pm$ 1,31
at 24 months	139,6 $\pm$ 4,25	134,9 $\pm$ 6,31	135,9 $\pm$ 2,77
Full age bulls	185,8 $\pm$ 7,05	175,4 $\pm$ 10,12	191,4 $\pm$ 8,39
Heifer at 12 months	114,0 $\pm$ 3,42	110,3 $\pm$ 2,17	109,2 $\pm$ 2,71
at 18 months	127,5 $\pm$ 2,31	121,5 $\pm$ 1,88	113,1 $\pm$ 4,24
at 24 months	131,6 $\pm$ 4,24	130,8 $\pm$ 2,92	128,2 $\pm$ 3,62
Full-age cows	178,8 $\pm$ 6,33	170,4 $\pm$ 7,54	163,5 $\pm$ 5,16
Oblique torso length Bulls at 12 months, cm	132,4 $\pm$ 3,75	128,9 $\pm$ 4,33	128,9 $\pm$ 2,77
at 18 months	141,5 $\pm$ 2,22	137,6 $\pm$ 4,45	131,4 $\pm$ 1,23
at 24 months	187,7 $\pm$ 4,77	174,8 $\pm$ 3,54	149,3 $\pm$ 3,56
Full age bulls	195,6 $\pm$ 8,12	185,9 $\pm$ 9,08	177,8 $\pm$ 11,47
Heifers at 12 months	121,5 $\pm$ 2,31	118,7 $\pm$ 5,47	117,8 $\pm$ 4,02
at 18 months	134,2 $\pm$ 1,18	129,2 $\pm$ 4,25	126,9 $\pm$ 2,33
at 24 months	153,0 $\pm$ 3,94	151,4 $\pm$ 9,96	137,4 $\pm$ 7,38
Full-age cows	755,4 $\pm$ 6,28	172,5 $\pm$ 11,13	158,2 $\pm$ 10,12

Table 4. Slaughter indicators of bulls at different ages, $\bar{X} \pm S_x$

Breed and age	Weight, kg				Slaughter output, %	Coef. Meatiness
	steam room carcass	interior fat	offal	skin		
Men-Anjou						
at 18 months	324,2±9,18	15,9±1,02	31,3±2,11	57,3±9,05	68,9±2,03	5,7
at 24 months	405,0±12,11	16,2±2,09	33,8±4,23	72,11±4,11	65,3±1,11	5,6
at 30 months	473,6±15,05	18,9±4,22	38,9±4,45	81,14±9,08	63,0±2,17	5,4
Kian						
at 18 months	311,3±5,09	14,2±1,31	30,6±2,02	52,21±1,14	62,4±1,21	5,5
at 24 months	390,5±13,14	15,8±3,42	31,9±3,11	68,1±5,22	61,6±1,38	5,4
at 30 months	454,9±14,08	17,9±5,33	36,5±4,15	74,3±12,02	61,7±2,14	5,4
Santa-Gertrude						
at 18 months	233,3±1,77	13,6±3,35	25,0±0,48	42,4±1,08	62,7±1,26	5,6
at 24 months	304,4±1,34	16,4±2,24	30,7±0,27	42,7±4,18	64,2±2,14	5,4
at 30 months	381,9±1,19	18,9±1,99	35,9±0,84	67,0±3,22	59,8±1,29	5,5

meat is acidity, which at all age periods was slightly acidic (6.2-6.6), which means that it can be well stored for a long time. Quite naturally, the color intensity also increased with age, from pink-red at 18 months to dark red at 30 months.

The meat of gobies killed at the age of 18 months was the most tender. Cooking correlates with a high degree of confidence with tenderness ($r = 0.76$), weakly bound water ($r = 0.71$), the amount of pressed juice ($r = 0.68$) and negatively with strongly bound water ($r = -0.71$) and water-holding capacity ($r = -0.66$). Beef with a high water-holding capacity loses less moisture

during heat treatment – the higher the water-holding capacity, the less swelling, which allows you to get a juicier finished dish and a greater choice of it.

With increasing age, the indicators of tasting assessment and culinary qualities of beef also slightly decreased (juiciness, aroma), but not enough to speak of a deterioration in consumer properties (4.5 points on a 5-point system).

The eatability of the diet in animals of all studied breeds is high (97–98 %). Moreover, there was no struggle for the feeding front (1.2

Table 5. The quality of gobies meat

Breed and age	Longest back muscle				Chemical composition of the average sample, %			
	pH	boil bone	tenderness	moisture eat, %	water	fat	protein	fat: protein
Men-Anjou								
at 12 months	6,4	44	0,591	1,82	57,1	15,2	16	0,9
at 24 months	6,3	40	0,698	2,61	54,4	28,1	17	2,7
at 30 months	6,5	37	0,712	3,04	51,3	31,4	22	1,4
Kian								
at 12 months	6,2	45	0,494	1,91	54,2	23,2	14	0,0
at 24 months	6,4	42	0,701	2,72	52,1	25,4	14	1,8
at 30 months	6,6	38	0,715	3,17	50,3	36,5	17	2,1
Santa-Gertrude								
at 12 months	6,4	45,5	0,482	1,73	1,73	18,4	14	1,3
at 24 months	6,5	39,8	0,702	2,55	2,53	30,9	15	2,0
at 30 months	6,4	38,1	0,714	3,11	3,11	31,4	14	2,0

m), but the Kians are somewhat aggressive. It is quite natural that with age and growth and decrease in average daily body weight gain, the cost per 1 kg of gain increases [8, 9]. However, 8.1–9.2 kg gains per 1000 MJ obtained over 2.5 years indicate a high ability of bulls to convert feed into products.

With the age of animals and an increase in live weight, they grow somewhat. However, considering that in order to gain in the first peri-

od of life, you must first get a calf. This is preceded by the cost of reproduction. At the same time, a more complex and expensive structure of the diet, more comfortable conditions are required, a high risk of mortality, then after 18 months of age it is much easier and cheaper to get an increase on an existing calf [10–15].

Therefore, we believe that animals should be raised for meat of all studied breeds up to 2.5 years of age.

Table 6. Costs of feed per 1 kg of live weight gain of bulls, MJ

Age	Breed		
	Men-Anjou	Kian	Santa-Gertrude
Costs per 1 kg aged, month			
12-15	69	84	108
15-18	78	99	110
18-24	121	139	150
24-30	138	141	154
Costs for live weight, kg			
to 300	71	89	84
301-400	80	97	100
401-500	118	117	123
501-600	134	133	138
601 and more	140	141	144
The gain received is 1000 MJ, kg	9,2	8,6	8,1

Conclusions. Under the conditions of the Ukrainian steppe, gobies of Men-Anjou, Kian and Santa-Gertrude breeds showed productive and slaughter qualities characteristic of their genotypes during the formation of phenotypic traits. Imported breeds can be a source of genetic diversity in the development of beef cattle breeding in Ukraine. Raising animals of the

Men-Anjou, Kian and Santa Gertrude breeds up to 2.5 years of age will increase the production of high-quality beef in order to improve the supply of meat to the population and strengthen the country's food security. They steadily pass on their positive traits to the offspring, which can be used in the development of beef cattle breeding in Ukraine.

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УДК 636.4.631

Козир В. С. Формування фенотипових особливостей бичків імпортованих м'ясних порід різного еколого-генетичного походження в умовах степу України

Тваринництво Степу України. 2022. Т. 1. № 1. С. 6–12.

Державна установа Інститут зернових культур НААН, вул. Володимира Вернадського, 14, м. Дніпро, 49009, Україна

Проведено науково-господарські дослідження продуктивності бугайців імпортованих м'ясних порід мен-анжу, кіанська та санта-гертруда у віковому аспекті в умовах степу України. У дослідному господарстві «Поливанівка» ДУ Інститут зернових культур НААН сформувавши їх у групах по 15 голів. Умови вирощування, технологія утримання, рівень годівлі були однаковими. До 18 місяців тварин утримували безприв'язно, а в подальшому – на прив'язі. Раціон балансували за нормами ВІТ традиційними для степової зони кормами. Забій тварин проводили у 18-, 24- та 30-місячному віці по 5 голів у групі. В дослідженнях використовували зоотехнічні, біологічні, аналітичні, біохімічні, морфологічні, біометричні методи.

Доведено, що з метою більш ефективного використання поголів'я та отримання високоякісної конкурентоспроможної яловичини для поліпшення постачання населення м'ясом, доцільно їх вирощувати до 2,5-річного віку. При цьому клінічні показники та показники біохімії крові у них були в нормі. За енергією росту і конверсії корму в усі вікові періоди домінують тварини мен-анжу, вони також раніше за інших однолітків досягають маси 600 і більше кг за рахунок масивності і габітусу тіла, у них більша маса туші, внутрішнього жиру, субпродуктів і шкіри, в результаті вище забійний вихід. За коефіцієнтом м'ясності, хімічним складом яловичини, її кулінарними та смаковими якостями відмінності незначні.

М'ясо бугайців всіх порід, що досліджувалися, відповідає попиту споживача і широко ним використовується. Встановлено, що для степової зони України імпортовані породи є не тільки джерелом виробництва високоякісної яловичини для поліпшення постачання населення, але й джерелом генетичного різноманіття для промислового схрещування, а в подальшому і для використання в породотворному процесі. Вони стійко передають свої позитивні ознаки потомству, що можна використовувати при становленні м'ясного скотарства України.

Ключові слова: м'ясна худоба, вік, енергія росту, жива маса, забійні показники, якість, конверсія корму.