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# The relationship between the polymorphisms of CAST(206 G>A) and CAPN-1(283>T) genes and biochemical blood parameters of Iraqi local goats

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# Abstract

100 Blood samples of male Iraqi Local goats aged (10-12) months were collected from Al-Diwaniyah slaughterhouse were completed analysis in postgraduate labs of Agriculture College of Al-Muthanna and Al-Qadisiyah University . While molecular aspect it was conducted in Marshlands Thi-Qar University Res. Lab. The study aimed to show the relationship among the polymorphisms of CAST(206 G>A) and CAPN-1(283>T) genes and biochemical blood parameters of Iraqi goats. The results indicate that there were no significant differences between the genotypes of the gene CAST(206 G>A), which were GG and GA, as well as the gene CAPN-1(283>T) which are CC, CT and TT in the studied blood parameters, which were cholesterol, triglycerides, HDL, LDL globulin, albumin, protein, glucose, red blood cell count, white blood cell count, hemoglobin and packed cell count (PCV).

Key words: Polymorphisms, CAST(206 G>A), CAPN-1(283>T), biochemical blood, Iraqi goats.

### Introduction

Livestock has developed in many countries around the world, especially developed countries, where it constitutes an important and integrated aspect of agricultural production and the economy. The income generated from livestock and production sources is estimated at about 50% of the revenues from agricultural production, it acts as a basic element in processing the daily consumption of red meat, milk and its derivatives by the population [1]. Livestock is one of the basics of the local and global economy in industrially advanced countries and countries around the world, it is an important tributary to agricultural and industrial production, in addition to modern economic progress, its income is estimated to exceed half of the economies of different countries and provides many components of the industrial side, from meat, milk, wool, hides, hair and other agricultural commodities [2].

Goats are one of the most suitable ruminant species for domestication in hot, dry and food-poor regions of the world. They are an ideal animal model to meet the global demand for animal protein sources. It has become necessary to develop appropriate strategies to maintain their numbers and production in the face of environmental changes. The global demand for animal protein sources has increased significantly for daily consumption in recent years [3].

Molecular markers help in determining the genetic makeup of the animal and thus predicting its performance [4]. Selection by this technique is a very important step in breeding programs [5]. Molecular marker information can be useful for identifying animals with high genetic merit for tenderness, selection can be performed on younger animals, slaughtered and even before birth for meat quality traits [6]. The calpain system began to be discovered when protein and calcium-dependent activities were identified in the brain and other tissues [7,8]. It controls a number of fundamental physiological processes including cell structural remodeling, helps regulate blood clotting and blood vessel diameter and plays a role in memory, it is found ubiquitously in mammals and other organisms [9]. It was first characterized in skeletal muscle by [10].

The present study aims to demonstrate The relationship among the polymorphisms of CAST(206 G>A) and CAPN-1(283>T) genes and biochemical blood parameters of Iraqi goats.

## Materials and Methods:

Blood samples were taken from the modern Diwaniyah model slaughterhouse from 100 goats after knowing the animal's sex and age by teething. The blood tests were completed in Agric. College lab., University of Al-Qadisiyah. As for the molecular aspect, it was conducted in the Marshlands, Thi-Qar Univ. Res. Lab.

Blood samples were collected from Iraqi goats directly from the animal before slaughtering, they were taken from the jugular vein using sterile medical syringes with a capacity of 10 ml, after cleaning the vein area, with a sample for each animal of 8 ml per sample. The samples were divided

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into three sections, the first and second sections, samples of 2 ml, they were placed in tubes containing (Ethylene Diamine Tetra Acetic Acid) anticoagulant [11], to perform the extraction process and a complete blood count, then stored in the refrigerator, as for the third section of blood samples, 4 ml, they were placed in a Gel tube free of any anticoagulant, to allow the blood to clot to facilitate the serum isolation process, they were placed in a centrifuge at a speed of 3000 rpm for 10 minutes, then the serum was withdrawn using a sterile syringe, it was placed in new, sterile test tubes and stored in the freezer at 15°C, for the purpose of conducting hormone and biochemical tests.

### **Results and Discussion**

Table (1) shows no sig. differ among GG and GA genotype, resulted from this mutation at site 206 of the studied segment of the CAST gene in the blood biochemical parameters of Iraqi goats, on cholesterol, triglycerides, high-density lipoprotein, total protein, albumin, lowdensity lipoprotein, globulin and glucose, from genotype GG and GA for cholesterol were 79.053, 81.255, triglycerides (59.759, 60.592), high-density lipoprotein (53.739, 53.792), low-density lipoprotein (13.355, 15.322), total protein (65.980, 63.582), Albumin (28.9636, 29.5080), Globulin (37.033, 33.734) and Glucose (99.197, 99.613) respectively, The results of this study were close to Al-Ghalbi [12], show that a significant correlation in the percentage of protein, albumin, cholesterol, HDL and LDL, when studying the relationship between some genetic genes and productive and physiological performance in Iraqi buffaloes. The researcher used 30 female buffaloes with their newborns, 30 male and female newborns. Other studies were also found on the percentage of protein, it was found that its percentage for the Leptin gene was 6.45, 6.64 and 6.73, for the genotypes CC, CT and TT respectively [13].

Genotype	Animal No.	Cholestrol (mg/dI)	Triglyceride (mg/dI)	HDL (mg/dI)	LDL (mg/dI)	Total Protein (mg/dI)	Albumine (gm/dI)	Globulin (gm/dI)	Glucose (gm/dI)
GG	32	2.±79.053 411	1.±59.759 172	1.±53.739 699	1.±13.355 497	0.±65.996 963	0.±28.963 312	0.±37.033 983	2.±99.197 132
GA	18	2.±81.255 463	2.±60.592 070	2.±53.792 129	1.±15.322 867	1.±63.242 292	0.±29.508 271	1.±33.734 481	2.±99.613 560
Si	g.	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

Table (1) The relationship between the genotype of the CAST(206 G>A) gene and the blood biochemical parameters of Iraqi goats (mean  $\pm$  standard error).

Table (2) shows that there were no sig. differ among GG and GA genotypes, from this mutation at site 206 of the studied segment of the CAST gene, on some blood cell characteristics in Iraqi goats in each of the number of red blood cells, the number of white blood cells, the concentration of hemoglobin and the volume of packed blood cells, as the results for the genotypes GG and GA, for the number of red blood cells (17.551, 18.520), the number of white blood cells (16.241,

16.248), the concentration of hemoglobin (10.889, 10.943), and the packed volume cells (35.242, 35.555) respectively. The results of this study were close to the results reached by the researcher Majhool [14], when he studied the blood biochemical parameters measured in local goats, for the purpose of identifying, to detect the effect of age, weight and gender on blood biochemical characteristics and parameters and to measure hormone levels.

Table (2) The relationship between the genotypes of the CAST(20	o G-A) and blood traits
of Iraqi goats (mean ± standard error).	

Genotype Animal No.		red blood cells (10 <sup>3</sup> / ml cell)	white blood cells (10 <sup>6</sup> / ml cell)	Hemoglobin (mg/dI)	packed volume cells (%)	
GG	32	$0.449 \pm 18.520$	0.062±16.241	$0.103 \pm 10.943$	$0.226\pm35.555$	
GA	18	$0.390 \pm 17.551$	0.048±16.248	$0.129 \pm 10.889$	$0.245 \pm 35.242$	
Sig	g.	N.S	N.S	N.S	N.S	

Figure (1) indicates that there were no sig. differ between GG and GA genotypes resulting from this mutation at site 206 of the studied segment of the CAST gene with the hormone cortisol. The levels of the hormone cortisol in Iraqi goats were as follows: 19.16, 18.261 for animals carrying the genotypes GG and GA, respectively. This study came close to Al-Mutairi [15] reached in the absence of a significant correlation between the genotypes GG and GA and the level of the hormone cortisol when studying some productive and physiological traits of Holstein Friesian cows.



Figure (1) Cortisol hormone level for genotypes of the CAST(206 G>A) gene of Iraqi goats.

Table (3) shows that there were no sig. differences among CC, CT and TT genotypes, from this mutation at site 283 of the studied segment of the CAPN-1 gene in the blood biochemical parameters of Iraqi goats, on cholesterol, triglycerides, high-density lipoprotein, total protein, albumin, low-density lipoprotein, globulin and glucose. The results for the genotypes CC, CT and TT, for cholesterol (78.135, 82.408 and 80.710), triglycerides (60.451, 60.073 and 57.815), high-density lipoprotein (53.022, 54.183 and 56.438),

low-density lipoprotein (13.012, 16.204 and 12.670), total protein (64.609, 65.235 and 67.559), Albumin (28.9674, 29.4930 and 29.1020), Globulin (35.661, 35.382 and 38.458) and Glucose (98.881, 101.119 and 95.924) respectively. The results of this study were close to Allen and Voster [16] reached when they studied 48 goats at the age of 7 months to know the effect of the grazing system on the concentration of blood receptors and carcass characteristics of Nguni goats.

Genotype	Animal No.	Cholestrol (mg/dI)	Triglyceride (mg/dI)	(Ip/gm) TUH	LDL (mg/dl)	Total Protein (mg/dI)	Albumine (gm/dI)	Globulin (gm/dI)	Glucose (gm/dI)
CC	28	$\pm 78.135$ 2.438	$\pm 60.451$ 1.401	$\pm 53.022$ 1.814	$\pm 13.012$ 1.586	$\pm 64.628$ 1.059	$\pm 28.967$ 0.354	$\pm 35.661 \\ 1.097$	$\pm 98.881$ 2.476
СТ	17	$\begin{array}{r}\pm 82.408\\3.044\end{array}$	$\begin{array}{r}\pm \ 60.073\\2.038\end{array}$	± 54.183 2.142	± 16.204 2.013	$\pm 64.875$ 1.338	$\pm 29.493 \\ 0.288$	$\pm 35.382 \\ 1.558$	101.119 2.208 ±
TT	5	$\begin{array}{r}\pm 80.710\\4.835\end{array}$	$\pm 57.815$ 1.369	$\begin{array}{r}\pm 56.438\\ 4.794\end{array}$	$\pm 12.670$ 3.258	$\begin{array}{r}\pm 67.56\\2.502\end{array}$	± 29.102 0.312	± 38.458 2.712	$\pm 95.924 \\ 4.673$
Si	g.	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

Table (3) The relationship between the genotypes of the gene CAPN-1(283>T) and the blood biochemical parameters of Iraqi goats (mean  $\pm$  standard error).

Table (4) indicates that there are no sig. differ among CC, CT and TT genotypes, from this mutation at site 283 of the studied segment of the CAPN gene, on some blood cell characteristics in local goats, on each of the number of red blood cells, the number of white blood cells, the concentration of hemoglobin and the volume of packed blood cells, as the results for the genotypes CC, CT and TT for the number of red blood cells were 18.460, 17.939 and 17.350 and the number of white blood cells were (16.291, 16.190 and 16.214), the concentration of hemoglobin was (10.934, 10.837 and 11.158) and the of packed cells volume (35.600, 35.171 and 35.480) respectively. The results of this study did not agree with Al-Saeedi et al. [17] studied 24 male Awassi sheep at the Al-Dubuni Research Station in Wasit Governorate, General Authority for Agricultural Research / Ministry of Agriculture.

Table (4) The relationship between the genotypes of the CAPN-1(283>T) gene and blood
characteristics in Iraqi goats (mean ± standard error).

Genotype Animal No.		red blood cells (10 <sup>3</sup> / ml cell)	white blood cells (10 <sup>6</sup> / ml cell)	Hemoglobin (mg/dI)	packed volume cells (%)	
CC	28	$0.476 \pm 18.460$	0.053±16.291	$1.107 \pm 10.934$	$0.240\pm35.600$	
СТ	17	$0.404 \pm 17.939$	0.078±16.190	$0.136\pm10.837$	$0.273 \pm 35.171$	
TT	5	$1.332 \pm 17.350$	0.049±16.214	$0.290 \pm 11.158$	$0.458\pm35.480$	
Sig.		N.S	N.S	N.S	N.S	

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