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RESEARCH ARTICLE

# Study of the Relationship between Some Genetic Markers and Some Productive Traits of Arabi Sheep in the Steppe of Muthanna

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## Abstract

The study carried out in the first research station to the College of Agriculture-Al-Muthanna University, 12 km south west of Muthanna district and laboratories specializing in molecular genetics for the period from 15/11/2017 until 30/4/2018 in order to determine the relationship between genetic markers BM1258 and INRA023 with genotypes (90/125,120/135,95/140 and 100/90) and (190/220.180/200 and 185/170) bp Respectively and the production of milk and Its components the following are the most important results obtained: The presence outweigh the significant (P≤0.05) for marker BM1258 in ewes carrying genetic site 90/125 bp in the total production of milk and the length of the milking season the ewes bearing on others local 120/135 , 95/140 and,100/90 bp .while outperformed significantly (P≤0.05) ewes 120/135 bp genetic location in the proportion of fat significantly milk ewes bearing two hereditary 90/125 and 95/140 bp, which varied among them. The presence outweigh the significant (P≤0.05) for marker INRA023 in ewes bearing site genetic 185/170 in the total production of milk and the length of milking the ewes carrying two 190/220 and 180/200 season, while the superiority of ewes same location genotype 180/200 in the percentage of milk fat. Affected the results and there is a significant difference (P≤0.05) for Marker INRA023 in ewes same location genotype 180/200 bp in the proportion fat solids and protein content.

**Keywords:** *Sheep, Genetic markers, BM1258, INRA023.*

## Introduction

Estimate the amount of milk produced by the sheep that provide sufficient information to implement management strategies and the survival rate of births and increase the weight to the pre-weaning reflect ewe's ability to milk production [1]. Milk production differ ewes in and its components because of differences between breeds as the content and the level of the main components and the season, the type of birth, type diet and other factors [2].

The local diversity is essential to meet the future needs of meat and milk and therefore should take precautions to predict production and genetic aspects are able to respond rapidly to environments Iraq's food and conditions, which requires diversity in bred strains must therefore determine the storage locations and genetic knowledge of breeds and animals with the ability to resistance to various conditions and knowledge of animal production on the basis of genetic [3]. In order to know the genetic viability of many studies on sheep domestic conducted to see milk production, as noted a discrepancy in the production of milk between breeds and between individuals within the same strain which could be due to two parts genetic factors, as milk production is prime evidence in maternal ability to persevere in production [4]. There are several environmental factors that affect the milk production in sheep broadly outlined many of the studies carried out by some [5].

### Marker BM1258

There BM1258 marker in sheep on chromosome 20, consists of 22 bp and in the following order:

F- GTA TGT ATT TTT CCC ACC CTG C

R- GAG TCA GAC ATG ACT GAG CCT G

Studies about the size of the marker and the degree of annealing to him and the number of

alleles differ, as found [6] that the size of the marker 108-120 bp and 58 Annealing temperature (°C) and the number of alleles 8 allele. As found [7] that the size of the marker 106-144 bp and the number of alleles 14 allele.

**Inra023**

There is this marker on chromosome No. 1 in sheep, and consists of 24 bp and a single base and in the following order:

F: GAG TAG AGC TAC AAG ATA AAC TTC

R: TAA CTA CAG GGT GTT AGA TGA ACT C

The different studies about the size of a piece marker and the number of alleles and the degree of annealing him, [8] found that the size of the pieces marker was 198-223 bp either the degree of annealing temperature was 55 $^0$c and the number of alleles 16 allele. As found [9] that the size of the marker165-237 bp and the number of alleles23 allele.

## Materials and Methods

### The Traits

It has been evaluating the performance of sheep recipes for total milk production as well as the evaluation of sheep genetically engineered traits studied through: -

Calculate the total milk production of ewes included in the study based on the measurement of daily milk production, which has been measured monthly and per ewe way manual milking and isolating births for mothers at allele for a period of 12 hours from six in the evening until six in the morning.

Aleppo has been ewes in the morning and after the estimated daily production [10] based on the following equation [11]:

$$TMY = (T_1\text{-}T_0)\, M_1 + \Sigma\, (T_r - T_{r\text{-}1})\, (M_r + M_{r\text{-}1}) / 2$$

Since both represent:

TMY = total milk production, T1 = first measurement date, T0 = date of birth, Tr = measurement date in that month, Tr-1 = measurement date for the previous month, M1 = first measurement (the amount of milk kilograms), Mr = measurement in that month (the amount of milk kg), Mr-1 = measurement in the previous month (the amount of milk kg).

Milk samples collected during the ring morning as it was taking the same milk after the product from sheep blending milk are good for the sample be homogeneous and by about (50 ml (quoted directly to the analytical laboratories as well as the preservation of samples and lack of exposure to sunlight or high temperatures and then calculated components milk fat, protein and lactose every two weeks starting from the second week until the end of the production season using milk laboratory analysis device milk analyzers Julie Z7 after collecting samples during the milking process.

### Blood Samples Collection

Pulled samples of blood from the jugular vein (Jugular vein) by sample for each animal by 3 ml per sample using a medical syringe capacity of 10 ml after it has been cleaned jugular vein area and sterilized with alcohol ethyl, put blood samples in tubes containing a blocker material coagulation (Tetra Acetic Acid -EDTA Ethylene Diamine) and then kept the blood samples freeze Degree- 4 0 m until a nucleic acid extraction process Alraibouzay undiminished oxygen (DNA).

### Molecular Genetics of Traits Studied

### DNA Extraction

DNA was extracted from blood samples of sheep using several measurements (Kit) equipped Gene aid from the Korean company, according to the following steps:

- 200 Maekerolatr taken from the blood and placed in Eppendorf tube capacity of 1.5 ml.
- Add 20 Maekerolatr of solution (Proteinase K) was then flipping a process tube Alabndorf requested the tube to a shaker (Vortex).
- The lap of the tube for five minutes in a water bath at 060 degrees of heat.
- Shake the mixture to a shaker (Vortex).
- 5-200 Maekerolatr Added solution (GSB) beyond a simple shake and placed in a water bath for 20 minutes and 060 degrees of heat.
- Been extracted and put the tube 200 Maekerolatr of (Absolute ethanol) and then put the mixture in a double tube for the nomination, and then put the tube in a centrifuge (Centrifuge) at speeds of 1500 r / min one minute duration.

- Wash the work by adding 400 Maekerolatr from W1 to GS column and then put the tube in a centrifuge (Centrifuge) at speeds of 3000 r / min one minute duration.
- Add 600 Maekerolatr of Wash Buffer and then put the tube in a centrifuge (Centrifuge) at speeds of 3000 r / min one minute duration.
- Placed an empty tube in the centrifuge (Centrifuge) at speeds of 14,000 rev / min for three minutes.
- Raaiq transferred to a new Eppendorf tube (1.5 ml) and add Elution and left for three minutes and then introduced into the tube to a centrifuge (Centrifuge) at speeds of 14,000 rev / min for one.

**Prepare Gel Alokaros Agaros Gel Preparation**

Before starting detects extraction process (Total-DNA) has been conducting samples drawn carry-on gel Alakaros and a concentration of 1% of any melt 1 g of material Alakaros in 100 ml of diluted TBE solution (1X then heated brokered by the microwave for 5 minutes until they get a color Raa'iq then add 5 Maekerolatr of dye Ethidium bromide and left to cool slightly and then pour the jelly in deportation basin for the purpose sclerosis, after hardening gel and raise the comb is added 5 Maekerolatr of DNA and then connect the poles to equipped with the ability (power supply) and demonstrate the power of the power supply of 80 volts and 65 amps for 30 minutes after the completion of the deportation was examined jellies device documentation Gel documentation of data to confirm the presence of DNA [12].

**Minute Sequences Microsatellites Technique Technology**

I attended the special technique PCR materials and placed in a vessel containing pieces of ice for the purpose of protecting it from the heat was working in a sterile and clean place in a private PCR Cabinet cabins containing ultraviolet rays in order to sterilize micro pipettes and tubes and Altbaat, a mixture PCR attended the tube Eppendorf 100 Maekerolatr capacity ( lμ) and the final size of the components 25 microliter and then placed in a centrifuge (Micro centrifuge) for 30 seconds and then to mix the reaction mixture.

**Markers Sequences Minute Marker Microsatellite**

Named three markers (INRA023 and BM1258) to determine their relationship with

some production traits in sheep, has been started it determine the degree of correlation (Annealing) sequentially complement him in the DNA template for each name using the grading process is so specific and the name of the heat.

**Electric Deportation of PCR Product Technology**

To determine the success of the multiplication process or amplify a piece of DNA to be determined by the markers used by the electric deportation gel Alakaros, as it is taken 5 Maekerolatr of a product of the PCR and placed in the drill with the use of a teacher (Leader) the size of 25 nitrogen base (DNA Marker-25bp) .

**Statistical Analysis**

The data were analyzed statistically using the program Statistical Analysis System - SAS [13] to study the effect of genetic manifestations (Polymorphism) markers genetic BM1258 and INRA023 in milk production and its components and compared the significant differences between the averages using Duncan test [14] polynomial by applying the method of averages Least squares (Least square means).Mathematical model to investigate the relationship BM1258 marker in milk production and its components.

$$Yijkl = \mu + Gi + Pj + Tk + eijkl$$

Yijkl: the value of viewing l belonging to the installation of the genetic sequence of i and j production cycle and the type of birth k.

μ: the overall average for the recipe.

Gi: the impact of marker alleles BM1258.

Pj: the impact of the sequence of the production cycle.

Tk: the effect of birth type (single, twin).

eijkl: random error which is distributed naturally average equal to zero and the variation of 2eσ.

In the same way for the second Marker INRA023.

 

It also used the chi square test (Chi-square-χ2) to compare the percentages for the presence of alleles for each name in the genetic sample studied sheep.

## Results and Discussion

### Genetic Relationship Appearances (Genotype) for Marker Genetic BM1258 in Milk Production

Table (1) ewes carrying forms of hereditary prepare genotype where (90/125,120/135,95 /140 and 100/90) bp of Marker BM1258, have outperformed significantly (P≤0.05) ewes that carry the same alleles 120/135,95/140 sites and 100/90 ewes bearing sites consist of five alleles in total milk production and that the total milk production with 77.00, 78.80, 79.08 and 74.60 kg respectively As for the length of lactation has outperformed significantly (P≤0.05) ewes that carry genetic sites carrying alleles on the rest of the ewes, with the length of lactation with 120.02 on the rest of the ewes were 117.50, 115.92, 115.50 day of ewes that with genetic sites that carry alleles numbers 120/135,95/140 and100/90 bp and note influenced milk production this marker different Petrakibh this results rapprochement reached by [15] the existence of the effect of genetic markers (ILSTS087, BM6444,MAF070, MAF209, OARFCB304 and SRCRSP15) on total milk production in sheep Hamdania also found that the value of P value for the production of total milk were 0.040, 0.017,0.050, 0.039 and 0.001 genetic markers ILSTS087, BM6444,MAF070, MAF209, OarFCB304 and SRCRSP15 in a row, we can infer by the results of the superiority of ewes that carry genetic sites that contain Alelien in total milk production and milk along the season.

**Table 1: Genetic relationship genotype for genetic marker (BM1258) with milk production**

| Genotype(bp) | Average ± standard error | |
|---|---|---|
| | Total milk production (kg) | length of lactation (Day) |
| **90/125** | 77.00±1.87<br>a | 120.02±1.10<br>a |
| **120/135** | 78.80±1.04<br>a | 117.5±0.61<br>b |
| **95/140** | 79.08±1.03<br>a | 115.92±0.61<br>b |
| **100/90** | 74.60±2.57<br>b | 115.50±1.52<br>b |
| Level of significance | * | * |
| Averages that carry different letters within the same column significantly differ among themselves (P≤0.05)* | | |

### Genetic Relationship Appearances (Genotype) of the BM1258 Marker Genetic Components of Milk

Note by the results of the experiment revealed significant differences (P≤0.05) in the percentage of milk fat between the ewes that carry different genetic packages as it overtook ewes that carry genetic packages consist of alleles on the rest of the ewes with different packages in a number Alelatha as she was fat ratio of 7.29, 5.93, 6.29 and 5.96 % of ewes that carry genetic packages consist of 90/125,120/135, 95/140 and 100/90 bp in a row. There was no significant difference in the rest ratios milk components (lactose, protein, solids not fat) as the proportions of lactose 4.26, 4.32, 4.42 and 3.91% protein 5.20, 5.63, 5.44 and 5.14%, while the solids not fat were 11.26, 10.72, 10.56, and 10.28% of ewes that carry genetic consist of 90/125, 120/135, 95/140 and 100/90 bp respectively, and found [15] at study on the exact sequences of Marker CSN3 relationship between milk production and its components and size pieces marker that they were the fat content and protein content of 5.95 and 5.08% when the size of the marker 287bp and 6.03 and 5.14%, respectively, when the size of the marker 295 bp.

**Table 2: Genetic relationship genotype of genetic Marker (BM1258) with milk components**

| Genotype (bp) | Average ± standard error | | | |
|---|---|---|---|---|
| | Fat % | Lactose % | Protein % | Solids non-fat % |
| 90/125 | 7.29 ±1.32<br>a | 4.26 ± 0.13<br>a | 5.20 ±0.73<br>a | 11.26 ±0.22<br>a |
| 120/135 | 5.93 ± 0.68<br>b | 4.32 ±0.04<br>a | 5.63 ±0.23<br>a | 10.72 ±0.22<br>a |
| 95/140 | 6.29 ± 0.68<br>b | 4.12 ±0.04<br>a | 5.44 ±0.24<br>a | 10.56 ±0.24<br>a |
| 100/90 | 5.96 ± 1.79<br>b | 3.91 ±0.13<br>a | 5.14 ±0.40<br>a | 10.28 ±0.41<br>a |

 

| | | | | |
|---|---|---|---|---|
| Level of significance | * | NS | NS | NS |
| .Averages that carry different letters within the same column significantly differ among themselves .(P≤0.05) * , NS: Non significant | | | | |

## Genetic Relationship Appearances (Genotype) Genetic Marker INRA023 Producing Milk

Table (3) the existence of significant differences (P≤0.05) between ewes that carry different genetic genotypes Marker INRA023 excelled as ewes with genetic packages that carry 190/220 and 185/170 bp in total milk production of the ewes with genetic packages that consist of 180/200bp, as the total milk production with 72.02, 68.59 and 72.18 kg of ewes bearing the sites of genotype 190/220, 180/200 and 185/170 bp, respectively as for the length of the milking season was the significant superiority (P≤0.05) of ewes with genetic packages that consist of 185/170 bp on the rest of the genetic packages and the length of milking her season 111.01, 105.04 and 104.73 on the ewes that carry genotypes consist of 185/170,190/220 and 180/200 bp of Marker INRA023 respectively, [15] when studying this marker and its relationship producing milk as sheep divided into three groups (high, medium and Low) depending on the genotype of economic evidence (genetic-economic index) was the milk production in the high group 190.20 kg / ewe which genetic packaged of six alleles for Marker BM1818 and milk production in low-lying group 22:44 consists kg / ewe in ewes that carry genetic packages Marker BM1818 consists of seven alleles.

**Table 3: Genetic relationship genotype for genetic marker (INRA023) with milk production**

| Genotype (bp) | Average ± standard error | |
|---|---|---|
| | Total milk production (kg) | length of lactation (Day) |
| 190/220 | 72.02 ±1.26<br>a | 105.041 ±0.83<br>b |
| 180/200 | 68.59 ±1.58<br>b | 104.73 ± 1.04<br>b |
| 185/170 | 72.18±1.63<br>a | 111.01 ±1.08<br>a |
| Level of significance | * | * |
| .Averages that 5carry different letters within the same column significantly differ among themselves (P≤0.05)* | | |

## Genetic Relationship Appearances (Genotype) Genetic Marker INRA023 Components of Milk

The study showed the presence of( P≤0.05) differences in the percentage of milk fat between the ewes that carry different genetic genotypes as it overtook ewes that carry genetic genotype contain 180/200 bp on ewes with genetic packages that contain 185/170 bp. There were no significant differences between the ewes that carry genetic packages consisting of 190/220bp and the rest of the ewes with different beams as she was fat ratio of 6.58, 7.24 and 5.85 % of ewes that carry genetic packages consist of 190/220 ,180/200 and 185/170 bp respectively, either protein outperforming significantly( P≤0.05) ewes that carry genetic packages consist of 180/200 bp on the rest of the ewes that carry different genetic packages that they were the ratios of 5.55, 6.39 and 4.85 % and outperformed significantly ( P≤0.05) in the proportion of Not fat solids in milk ewes carrying packages consist of 180/200 bp on ewes that carry genetic packages consist of 185/170 bp. There were no significant differences between the ewes that carry genetic packages consisting of 190/220 bp and the rest of the ewes with packages 180/200 and 185/170 bp as she was 10.54, 11.03 and 9.98 %, respectively, did not exist significant differences in the ewe's milk with different packages in the proportion of lactose milk and found[16] when in a study on the exact sequences of Marker CSN3 in sheep East Friesian dairy and Lacaune to the absence of significant differences between the marker and the percentage of fat and protein in sheep Lacaune and the lack of significant

 

differences between the marker and the percentage of fat and the presence of highly significant (P≤0.01) between the marker and the percentage of protein in sheep.

**Table 4: Genetic relationship genotype of genetic Marker (INRA023) with milk components**

| Genotype (bp) | Average ± standard error | | | |
|---|---|---|---|---|
| | Fat % | Lactose % | Protein % | Solids non-fat % |
| 190/220 | 6.58 ±0.65 ab | 4.46 ±0.04 a | 5.55 ±0.23 b | 10.54 ± 0.22 ab |
| 180/200 | 7.24 ±1.22 a | 4.79 ±0.03 a | 6.39 ±0.01 a | 11.03 ±0.19 a |
| 185/170 | 5.85 ±0.67 b | 4.41 ±0.05 a | 4.85 ±0.22 c | 9.98 ±0.23 b |
| Level of significance | * | NS | * | * |
| Averages that carry different letters within the same column significantly differ among themselves (P≤0.05).* , NS: Non significant | | | | |

## Conclusions

- Ewes that carry the genetic marker BM1258 same location the genetic component of the 95/140 bp superiority over the rest of the ewes that carry the other in total milk production markers.
- Outweigh the ewes in the percentage of milk fat marker bearing the INRA023 component of 180/200 bp on the rest of the ewes that carry other markers.

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