

Estimation of Repeatability for greasy fleece weight in Awassi sheep.

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The study was conducted on Awassi sheep by using 150 records of greasy fleece weight which collected through 2010 to 2013 from the flock reared in college of agriculture / kufa university. Two methods were used to estimate repeatability, simple correlation and analysis of variance. The results showed the estimates of repeatability of the year 2010 – 2011 , 2010 – 2012 and 2011 – 2012 were 0.42 ,0.53 and 0.76 respectively . Also the results revealed that the repeatability of greasy fleece weight which estimated by variance analysis method was 0.49 , this value was higher than value estimated by correlation method which being 0.44. .

Keywords :Awassi sheep , Fleece weight , Repeatability

Introduction

Awassi is one of the dual-purpose, fat-tailed sheep breeds which can be accepted as a sheep-milk resource in south-west Asia (Iraq, Jordan, Palestine, Lebanon and Turkey). It also exists in Europe, Australia, New Zealand, and China. The breed is well adapted to harsh conditions and capable of producing and reproducing under these circumstances (4).

Repeatability is a measure of the strength (consistency, reliability) of the relationship between repeated records (repeated phenotypic values) for a trait in population. Repeatability can be determined for any trait in which individuals commonly have more than one performance record.(12).

In sheep, repeatability is a measure of the tendency of animals to maintain their ranking over time. It describes the accuracy with which early records of an animal's performance in a particular trait can predict its lifetime performance. It's used to assess which sheep to cull and which to keep, rather than which are the most suitable for breeding. (2) and (8). Wool traits such as greasy fleece weight, clean fleece weight and fiber diameter are repeated

seasonally on same animal so we can measure this traits every season and get many records . Many studies refer that the repeatability of greasy fleece weight is about (0.40 - 0.60) depending on the genetic variation among different sheep breeds or the different method of measurement.(6) and (10) .

If repeatability of early wool measurements with lifetime performance is very low, genetic improvement of lifetime performance would be slow because the accurate selection of the better animals would be difficult, without measuring several fleeces from each animal. On the other hand, if repeatability is high, selection for fleece gives a reasonably accurate indication of the animal's lifetime performance, and genetic progress would be faster.

Although the Awassi breed is used mainly for meat and milk production but it have also benefit from its production of wool and we can improve it performance in this direction so the major aim of this study is to estimate repeatability for greasy fleece weight by two methods (correlation coefficient and balanced design) using many records on the

same animal as a prediction parameter and use this information as guidelines or indicators for the management strategies for sheep under the farming conditions for selecting and improving the performance of domestic animals depending on this indicators and finally we can find Awassi flock specialized to produce good quantity and quality of wool after many generations of selection to this traits .

Materials and Methods:

Experimental Animals: Data were carried out in the department of animal resources ,college of agriculture , Kufa university for the period 2010 to 2013 on 240 records belong to Awassi breed sheep selected from the experimental flock reared under extensive conditions and the fleece in 2008 was the first fleece for all sheep used in this study.

management :Flock is housed under semi-open sheds and can be fed on the concentrated ration consuming about (500 – 600) gm / head / day, for the period from mating season to the last six weeks of pregnancy . Ration is normally containing 37% yellow corn , 40% wheat bran ,10% hulled barley , 5 – 10% soy bean meal ,1% NaCl and 1% CaCO₃ .and green roughages such

as Alfalfa and clover can be added throughout the season. Annual routinely operations on sheep are dipping and washing with chemicals in order to kill extra parasites so sheep will be ready to mating after hand wool shaving. Lambs are weighed directly after parturition and tagged with plastic tags . Lambs stays with their dams up to 90 days (weaning age) .The health status of the flock must be under regular observations.

Statistical analysis :

The results were analyzed by correlation coefficient and analysis of variance SAS .2000(13) computer program used to estimate repeatability of greasy fleece weight .

1- The simple correlation between every two seasons was calculated by the following formula:

Results and Discussion

Results presented in (table 1) show that the estimate of repeatability of annual fleece weight was 0.44 .The values reported by Morley (10) , Blackwell and Henderson(1) and Lower (7) range from 0.43 to 0.79 for different breeds of sheep in different locations. The value obtained is good agreement with the majority of these

Table(1): Estimate of repeatability by using correlations between tow records.

Samples	N	d.f	r	significance	R
2010 – 2011	58	55	0.42±0.121	*	0.44±0.064
2010 – 2012	54	51	0.53±0.073	*	
2011- 2012	50	47	0.76±0.093	*	
Mean	0.57±0.095				

*:p(≤0.05)

r: correlation coefficient

R: repeatability

Table(2): Estimate of repeatability using analysis of variance.

s.o.v	d.f	S.S	M.S	E.M.S
Among individuals	49	14.6	0.297	$\delta^2E + k\delta^2w$ $\delta^2w = 0.0741$
Within individuals	100	7.55	0.0755	δ^2E
Total	149	22.15		$R = 0.49 \pm 0.006$

$R: (\text{repeatability}) = \delta^2w / \delta^2w + \delta^2E$, $k: (\text{number of measurements for each animal}) = 3$ $\delta^2w = Msw - msc / k1$

values. The present results can be give a good indicator of heritability because the repeatability is the upper limit of heritability (3).

Results presented in table(2) shown that repeatability which estimated by analysis of variance method is about 0.49 . This values is more than 49% which resulted from variance for greasy fleece weight in different seasons which due to genetic effects and the effects of permanent environment (11). These results are similar to those established by McGuirk and Swinton (9) ; Galal and

$$r = \frac{\sum xy - \frac{\sum x * \sum y}{n}}{\sqrt{\sum x^2 - \frac{(\sum x)^2}{n} . \sum y^2 - \frac{(\sum y)^2}{n}}}$$

$$\text{S.E.of correlation} = \sqrt{1 - r^2/n - 2}$$

Where:

r : correlation coefficient value

n : number of records/animal

2- Using of balanced design to calculate repeatability by the following formula:

$$R = \frac{MS(\text{among individuals}) - MS(\text{within individuals})}{MS(\text{among individuals}) + (n-1)MS(\text{within individuals})}$$

Karam (5) , Who refer that repeatability of greasy fleece weight is about 0.40.

The current study showed a benefit of estimate repeatability of greasy fleece weight because it can help to determine the true ability of animal production and increase the accuracy of

future prediction of animal performance to facilitate culling and increase selection efficiency to accelerate genetic improving.

According the following linear model:

$$Y_{km} = \mu + \alpha_k + e_{km}$$

Where:

μ : overall mean

α_k : effect of animal k

ekm: environmental deviation to measure m on the animal k and all the effect are random.

$\frac{1}{2}$

$$SE(R) = \left(\frac{2(1-r)^2[1+(k-1)R]^2}{k(k-1)(n-1)} \right)^{\frac{1}{2}}$$

Where :

R: repeatability

K: number of observations for each animal

n: number of animals

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تقدير المعامل التكراري لوزن الجزة في الأغنام العواسية .

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المستخلص :

أجريت الدراسة باستخدام 150 سجلا لوزن الجزة لقطيع من الأغنام العواسية المربي في حقول قسم الثروة الحيوانية - كلية الزراعة - جامعة الكوفة للفترة مابين 2010 - 2013 . استخدمت طريقتان لتقدير المعامل التكراري هما معامل الارتباط و تحليل التباين . وقد أظهرت النتائج أن تقديرات المعامل التكراري بلغت 0.76 , 0.42 and 0.53 للسنوات (2010 - 2011) ، (2010 - 2012) و (2011 - 2012) على التوالي . كما أظهرت الدراسة أن المعامل التكراري لوزن الجزة المقدر بطريقة تحليل التباين كان 0.49 وهو أعلى من المعامل التكراري المقدر بطريقة معامل الارتباط حيث بلغ 0.44 .

الاغنام العواسية ، وزن الجزة ، المعامل التكراري