PERFORMANCE TESTING OF SMALL STOCK

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AIM:

Contrary to what is thought by most breeders, the availability of measured performance testing results is not aimed at increasing sale prices of rams, but to ensure the increased efficiency of production of each participating flock and also of the breed in general. Before the breeder has used this type of information himself in assisting with the selection of breeding stock, performance testing will be seen as no more than an added exasperation.

We live in a dynamic world and the rules applicable today are not necessarily going to apply tomorrow. It is for this reason that a breeder, and by implication a breed, must be dynamic to take into account these possible changes. Due to financial restraints most commercial farmers are required to increase efficiency annually and one method of attaining this is to select breeding stock based on maximum income (mainly the number of lambs born and the quality of lambs) with minimum input (mainly adapted, hardy ewes). The stud breeder must therefore ask himself if he is continually supplying his main clients (the commercial farmer) with animals more efficient in utilizing the available resources. Remember that a sound stud industry is dependant on a flourishing commercial industry and thereafter on sales of breeding animals to fellow stud breeders.

If the above-mentioned are important to a breeder, traits such as reproduction, growth and survival must be improved in his flock and he can do this by accurately identifying those animals that are genetically superior for these traits and using them in their breeding program. He can only achieve this by keeping accurate records, processing the records, interpreting these results correctly and to implement them in the flock.

The NATIONAL SMALL STOCK IMPROVEMENT SCHEME is so designed to generate maximum information with a minimum of inputs. It further incorporates different levels of record keeping. The more records that are kept, the more information that is generated. The scheme incorporates reproduction, growth, survival, quality and type of animal in an holistic way enabling the use of the information as a whole. The aim of the scheme is to identify the more efficiently producing animals. To achieve this there are certain minimum requirements set for the records to be of any meaningful value.

IDENTIFICATION SYSTEM

The basis for any record keeping system is that all animals that are measured must be identifiable. Within a breed or breed society there are guidelines in the constitution that determine how an animal should be numbered. It is imperative that a standard procedure should exist and that duplication should be eliminated.

The lamb is usually identified and numbered at birth. **It is very important that the animal must retain this number for the rest of it's life**. It is very confusing should this number change during an animal's life. All other numbers such as computer and/or registration numbers, names etc. can be added, but the identification number must be retained at all costs. This is especially important for the rams that are used in the flock as most rams are usually given a name or nickname. As with the registration number, the name of the ram is inferior to the original identification number the ram received at birth.

The minimum standards set in South Africa for all species consists of the following:

Stud number: To identify all animals born in a specific stud each breeder has an allocated stud number or Herd Designation Mark (HDM). This number can be alphabetical or numerical. The HDM should form part of the identification that is imprinted on the eartag. Should a breeder have more than one HDM (to receive sales advantages) he should only use one for identifying all his sheep. The SHEPHERD 2000 program uses the HDM as a default.

Year of Birth: The second section of the identification number is the year of birth. To limit writing the year of birth is shortened to the last two characters of the year; i.e. 04 for 2004 and 05 for 2005. To facilitate the looking up of animals they are usually sorted on the year of birth. On the eartag itself only the last character of the year can be entered; 4 for 2004, 5 for 2005.

Sequence number: This is a 4 character number that indicates the sequence in which the animals were born. Each year should commence at 1 but is not essential. To facilitate the looking up of animals they are sorted on this number. To ensure sorting on this is correct leading zeros should precede the number. This means that number 1 should be captured as 0001 and not just 1. Animal number 100 will be captured as 0100. The leading zeros need not be entered on the eartags. SHEPHERD 2000 automatically enters the leading zeros.

The first animal born into the ABC stud during 2005 will have an eartag number ABC 050001.

If the farmer uses family codes different sequences of numbers can be allocated. Each family could have a sequence of 1-100, 150-250, 300-400 etc. Alternatively each family could be allocated a number. For example family 1 could be identified as 1001, 1002 etc and family 2 could be identified as 2001 etc. If you wanted to retain the sequence of births the family and sequence marking could be 1001, 1002, 2003, 3004 etc. SHEPHERD 2000 also caters for different family codes and each lamb retains its family code.

There is often confusion when rams from different breeders are used. In many cases the ram only has a name without an identification number. It also occurs regularly that there are different rams that have the same name. To correctly identify these rams it is essential that they are also correctly identified with the HDM of the breeder, their year of birth is recorded and an acceptable sequence number allocated. Should you use an unidentified ram in your stud please try to get a correct identity number. When your stud is compared to other studs it is important that the correct relationships between the flocks are recorded.

CONTEMPORARY (TREATMENT) GROUPS

Information that is collected can only be used if it is comparable, correct and meets all basic requirements.

FUNDAMENTAL FACT

PHENOTYPIC APPEARANCE = GENETIC COMPOSITION + ENVIRONMENTAL INFLUENCES

The principle is that the differences that are perceived between animals, are a function of the genes that they received from their parents and the environment in which they are raised. It is only the genes that are transmitted to their progeny. Because we are interested in the value of an animal as a parent, we try to predict it's expected breeding value (EBV). With type we look at the animal and accept that how the animal looks is the result of the gene combination of its parents and accept that this is what it will transmit to it's progeny.

Most production traits however are determined by many genes that supplement each other. If we accept that environment had the same effect on a group of animals, then we can accept that the differences that we measure(or see) are the effect of the different gene combinations

FUNDAMENTAL FACT

ONLY ANIMALS THAT HAVE BEEN GIVEN THE SAME TREATMENT CAN BE COMPARED TO EACH OTHER FOR THEIR PERFORMANCE TRAITS

It is accepted that the **ENVIRONMENT** for all animals was the same and that the differences between them is an indication of their **BREEDING VALUE**. We call a group oof animals that have been treated the same a **CONTEMPORARY GROUP.** Only the breeder can identify these groups by indicating which animals have all had the same treatment. It is also logical that if the allocating of treatment codes is not

done properly any comparisons of animals to determine their breeding values for certain traits are not meaningful.

A contemporary group for reproduction and weaning data is, for example, all ewes with their progeny born within a 2 month period. It is accepted that the environmental effect on these animals is the same and that the environmental effect did not influence whether the ewes became pregnant or not. It is also accepted that the grazing for the first lamb born was more or less the same as for the last lamb born. It is obvious that with periods longer than the 2 months these suppositions are fallible. It is therefore important to ensure that every lamb is allocated to a birth season. In Shepherd each lamb born must be allocated to a season or birth group.

Ewes that lamb in the same season but have different treatments must be put into separate treatment groups, but the groups can be evaluated as one if the different groups are defined. These different treatment groups must be indicated so that necessary corrections can be calculated in order to make the results accurate.

Be careful not to make the contemporary groups (or treatment groups within a contemporary groups) too small. The rule is, as large as possible, and not less than 5 animals of the same sex and birth status.

If the treatment or contemporary groups are not indicated accurately, the rest of the data that is collected loses its value and could rather not be collected at all. **It is very important to remember that no data at all is better than incorrect data.**

KNOWN ENVIRONMENTAL FACTORS

There are several known environmental factors that have an influence on production. To eliminate the effect of the factors we usually apply correction factors, which include the following:

- Age of the animal at measuring (the younger the animal the greater is the effect which usually disappears by the time the animal reaches an age of one year and older)
- Sex (the effect of sex increases with age)
- Birth status (usually twins are lighter than singles)
- Age of the ewe (the performance of progeny of two-tooth ewes is usually less than progeny of older ewes)

In the NATIONAL SMALL STOCK IMPROVEMENT SCHEME the least squares method is used to determine the corrections for the above mentioned factors. This means that the actual differences are calculated in each case and the corrections are calculated from these differences. If these effects are not recorded or submitted with the data, the accuracy of the results will decrease.

INDEX

This is the weight of an animal expressed as a percentage of the average of the group (that all received the same treatment) after the known environmental effect corrections have been implemented. These values are known as INDICES.

CALCULATION OF AN INDEX

$$\frac{\textbf{The weight of an animal}}{\textbf{Average weight of the contmporary group}} \times 100$$

Example:
Ram weighs 70 kg and the average of the other rams in the contemporary group is 65 kg

His INDEX is thus : $(70 \div 65) \times 100 = 108$

An index of 108 for weaning weight means that the animal was 8% heavier than the average of the group (contemporary group) and it can be expected that it's progeny will on the average be heavier than the progeny of a ram with a 95 index(or 5% lower than the average)

DATA RECORDING

- Growth only
  Should the growth performance of a lamb be required, the simplest way is to submit a body weight. Additional information that will make the record more accurate is the birth date, birth weight, birth status and the age of the mother, as well as the date on which the weight was taken.

- Pre- and post-weaning growth
  The growth of the lamb to weaning is important, but equally important is the growth of the lamb after weaning. The heritablility of post-weaning growth higher than that of pre-weaning growth, which means that post-weaning growth genes can be measured more accurately. Pre-weaning growth is however largely a function of the mothering ability of the mother.

  If more than one weight of an animal is available, example wean and 270 day weights, an index is calculated for each weight. Further (see addendum 2) these weights are combined into one index so as to identify the beste wean and post-wean growers.

  As with a single weight the records become more accurate when more complete data is added such as birth date, birth status, age of mother as well as the the weighing date.

- Reproduction
  Large differences occur in the reproduction performance of ewes that received the same treatment. Although the traits has a low heritability, there is much phenotypic variation that can be utilized and it has been proven that a yearly genetic increase of 1-2% can be achieved. Selection for fertility has the following advantages:
    - Increases the income from the present flock;
    - Increases the income and efficiency of the future flock;
    - Insures that production remains within optimum borders set by the environment;
    - Selection guide for adaptability and hardiness.

  In the NATIONAL SMALL STOCK IMPROVEMENT SCHEME selection for fertiltity is calculated through the **total weight of lambs weaned per ewe productive year**. This measure doesn't only take the number of lambs born into consideration but also the quality of the lambs.

  For reproduction data, which ewes have which lambs must be recorded. If a ewe ran with a certain ram but did not lamb this must also be recorded. If she had a lamb that died at birth this must be recorded. Further, all lambs that survive to weaning must be weighed and their weaning date recorded. This weight will be used to determine the total weight of lambs weaned. This data is then stored and added together over years. A ewe's reproduction results are updated yearly.

  Little extra record-keeping is necessary and wean data is also used to calculated growth figures.

- Progeny testing
  If the sire of each lamb is recorded, then the performance of each ram's progeny can also be indicated. This information is very useful when decisions need to be made as to which rams must be used again. This value is a function of the number of progeny of a ram and the more progeny there is, the more the value is of the true breeding ability of the ram. A ram with an index of 105 will have progeny that are 5% better than the average. At the same time a ram with a 90 index wil have progeny that are 10% poorer than the average of the contemporary group.

- Subjective traits
  These traits are important as not all economically important traits can be measured. They are often breed-specific and traits that the society want to improve. To record subjective traits they must be scored. If these traits are given values (scores) they also become performance traits and provision must also be made to capture and store these values.

FILLING IN OF THE DOCUMENT

To simplify the filling in of the document each item, that must be filled in, is numbered. An example of the form is attached. Below is the number of each item or colomn and the data or codes that have to be filled in. With SHEPHERD 2000 this data is generated electronically. This data can also be formatted into a spread-sheet. A prescribed format is available.

In the example only growth results are required and columns 9, 11, 17 and 22 must be filled in. If more comprehensive data is available it can also be completed.

2.1 Member number This number is allocated by INTERGIS after the form in Addendum A has been completed.
2.2 Herd number. This is allocated to your flock.
3.2 Breed code: Leave open unless you are sure of the correct code.

The rest of the information is filled in for each animal.

4.1-4.3 Mother Id:	This is the number of the lambs mother in the format Studnumber, year of birth and sequence number.
6.1-6.3 Sire Id:	Sire of the lamb, identification is also Studnumber, Year of birth and sequence number.
8a Service code:	For natural mating use 1, for AI use 3 and inovulation use 4 . It is important to indicate embrio lambs so that the ewes correct reproduction records can be calculated.
8b Birth remarks:	1 = Natural birth, 2 = Abortion befgore 3 months. 3 = Abortion after 3 months, 5 = Died at birth, 6 = Destroyed, 18 = Lamb born alive but not marked, 19 = Ewe died at or before lambing**,** 20 = Ooi gedek maar het nie gelam nie.
9a-c Lamb Id:	Again Stud number, year of birth and sequence number.
11. Sex:	Female = 1 en Male =2
12. Birth date:	YYYYMMDD
13. Birth status:	Single=1, Twin=2, Triplet = 3 etc.
14. Age of mother:	Less than 30 months = 1, Older than 30 months =2
15. Birth weight:	Optional
17. Weight code.	These are codes for the different weight types as follows: 1= Pre-wean, 2= Wean, 3 = Post-wean and 4= mature weight
18. Environment code:	1=Veld, 2= Feedlot 3= Pastures 4= Veld plus additional feeding 5= Pastures plus additional feeding 6= Veld 75% and pastures 25% 7= Veld 50% and pastures 50% 8= Veld 25% and pastures 75%
19. Management group.	It is essential to record which animals have received treatment that differs from the others. If twins were seperated from the singles this must be recorded. If twins and singles were in the same group but the group was divided in two different camps,

it must be recorded which lambs were in which camp. Example camp A is then Mgp=1 and camp C3 is Mgp =2.

20. Rearing status: Weaned as single=1, weaned as twin=2 etc. If raised as "hans" code 9. This is important because it is accepted that the ewe did not raise her lamb.
21. Weighing date: YYYYMMDD
22. Weight In kg, preferably to the nearest 0,5 kg.
23. Scrotum circumference: In cm.
24. Grade: This is a subjective value describing the lamb i.e AA, ST, P etc. This is more important with mature weight as when the performance data is veiwed one has a visual value of the animal also.

After completion of the forms post to ARC:LBD, P/Bag X529, Middelburg, 5900-- where the forms will be checked and then captured. From this data the necessary reports will be generated giving the lamb's index, a summary of the ewe's performance as well as a sire summary. Depending on whether you use the electronic option or not the data will be returned electronically or in paper format.

RESULTS

The print-outs and the meaing of each print-out is shown in Addendum 2 and 3. See also the explanations that are available with each result.

BLUP BREEDING VALUES

With the development of BLUP (Best Linear Unbiased Prediction of an animals breeding value) the problems of evaluating animals from different environments was eliminated. This meant that animals did not have to be raised in the same environment to be compared to each other. It further meant that the variation that exists within a breed could be utilized to attain set goals quicker.

The important advantages of BLUP are as follows:

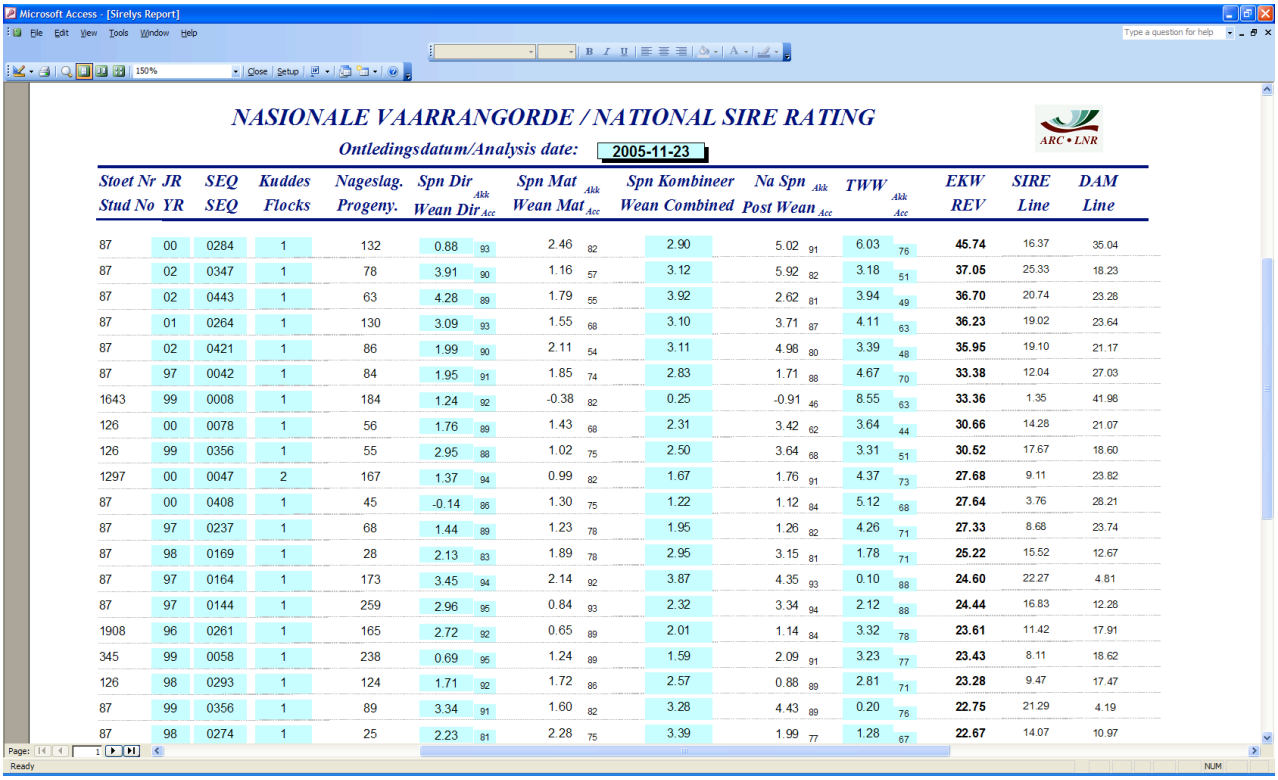
- Animals can be compared across environemts. This means that younger and older rams can be compared to each other. Further the complete variation in the breed is available and we are not limited to certain smaller groups.
- The effect of selection is immediately obvious. This can be considered as a "genetic audit" of the flock. Further these changes can be measured against the breed as a whole. BLUP can therefore be considered as the best "benchmark" of each flock. This makes it that much easier to identify the best rams.
- It is a more accurate method of selection as not only is an animal's own performance evaluated but also that of all related animals are taken into consideration.

Requirements for BLUP:

- Accurate measuring forms the corner stone of BLUP. It is therefore critical that the rules given above are adhered to.
- Recording of parentage is essential.
- There must be genetic links between all the environments. This means that more than one ram must be used and preferably two rams for 25 and more measured progeny in different studs.
- The same data must be recorded for all the studs.

As can be seen BLUP is only calculations of existing records to make more accurate information available.

This is an example of the National sire rating.



Microsoft Access - [Sirelys Report]

NASIONALE VAARRANGORDE / NATIONAL SIRE RATING

ARC • LNR

Ontledingsdatum/Analysis date: 2005-11-23

Stoet Nr / Stud No	JR / YR	SEQ / SEQ	Kuddes / Flocks	Nageslag. / Progeny.	Spn Dir / Wean Dir	Akk	Acc	Spn Mat / Wean Mat	Akk	Acc	Spn Kombineer / Wean Combined	Na Spn / Post Wean	Akk	Acc	TWW	Akk	Acc	EKW / REV	SIRE / Line	DAM / Line
87	00	0284	1	132	0.88		93	2.46		82	2.90	5.02		91	6.03		76	**45.74**	16.37	35.04
87	02	0347	1	78	3.91		90	1.16		57	3.12	5.92		82	3.18		51	**37.05**	25.33	18.23
87	02	0443	1	63	4.28		89	1.79		55	3.92	2.62		81	3.94		49	**36.70**	20.74	23.28
87	01	0264	1	130	3.09		93	1.55		68	3.10	3.71		87	4.11		63	**36.23**	19.02	23.64
87	02	0421	1	86	1.99		90	2.11		54	3.11	4.98		80	3.39		48	**35.95**	19.10	21.17
87	97	0042	1	84	1.95		91	1.85		74	2.83	1.71		88	4.67		70	**33.38**	12.04	27.03
1643	99	0008	1	184	1.24		92	-0.38		82	0.25	-0.91		46	8.55		63	**33.36**	1.35	41.98
126	00	0078	1	56	1.76		89	1.43		68	2.31	3.42		62	3.64		44	**30.66**	14.28	21.07
126	99	0356	1	55	2.95		88	1.02		75	2.50	3.64		68	3.31		51	**30.52**	17.67	18.60
1297	00	0047	2	167	1.37		94	0.99		82	1.67	1.76		91	4.37		73	**27.68**	9.11	23.82
87	00	0408	1	45	-0.14		86	1.30		75	1.22	1.12		84	5.12		68	**27.64**	3.76	28.21
87	97	0237	1	68	1.44		89	1.23		78	1.95	1.26		82	4.26		71	**27.33**	8.68	23.74
87	98	0169	1	28	2.13		83	1.89		78	2.95	3.15		81	1.78		71	**25.22**	15.52	12.67
87	97	0164	1	173	3.45		94	2.14		92	3.87	4.35		93	0.10		88	**24.60**	22.27	4.81
87	97	0144	1	259	2.96		95	0.84		93	2.32	3.34		94	2.12		88	**24.44**	16.83	12.28
1908	96	0261	1	165	2.72		92	0.65		89	2.01	1.14		84	3.32		78	**23.61**	11.42	17.91
345	99	0058	1	238	0.69		95	1.24		89	1.59	2.09		91	3.23		77	**23.43**	8.11	18.62
126	98	0293	1	124	1.71		92	1.72		86	2.57	0.88		89	2.81		71	**23.28**	9.47	17.47
87	99	0356	1	89	3.34		91	1.60		82	3.28	4.43		89	0.20		76	**22.75**	21.29	4.19
87	98	0274	1	25	2.23		81	2.28		75	3.39	1.99		77	1.28		67	**22.67**	14.07	10.97

Breeding values are available for weaning traits and post weaning weight. TWW is the TOTAL WEIGHT WEANED per ewe per annum. The accuracy depend on the number of daughters recorded.

Three selection index values are available. REV = to the economic returns per small stock unit per year. The sire line is for breeders/producers interested in cross breeding. The dam line puts ephasias on weaning maternal and TWW.

These same type of outputs are available for young animals without progeny.

ARC-NATIONAL SMALL STOCK IMPROVEMENT SCHEME
LNR-NASIONALE KLEINVEE VERBETERINGSKEMA

PAGE NO OF PAGES
BLADSY NR VAN BLADSY

SMALL STOCK INFORMATION SHEET / KLEINVEE INLIGTINGSVORM

1.1 DOCUMENT CODE / DOKUMENT KODE : 602/604
1.2 TRANSACTION CODE / TRANSAKSIE KODE : 1

2.1 MEMBER NO :
LIDNOMMER : I__I__I__I__I__I__I__I__I__I

2.2 FLOCK CODE :
KUDDEKODE : I__I__I__I__I__I__I__I__I__I

1.3 SPECIE CODE : 02
SPESIE KODE : 02

3.2 BREED CODE :
RASKODE : I__I__I__I

NAME :
NAAM ; _____

FOR EXPLANATION OF MEANING OF DIFFERENT CODES SEE INSIDE COVER

VIR DUIDELIKHEID OOR BETEKENIS VAN KODES SIEN BINNE OMSLAG

4.1 - 4.3			6.1 - 6.3			8A	8B	8C	9A -9C			11	12			13	14	15	17	18	19	20		21		22	23	
DAM ID			SIRE ID						SHEEP ID NR				BIRTH DATE											WEIGHT DATE			SC	
MOEDER ID			VADER ID			SC	BR	EL	SKAAP ID NO			SEX	GEBOORTEDATUM			BS	D	BTH WT	E	E	GRP	R	DATUM GEWEEG			WEIGHT	(CM)	
KKM	YY	SEQ	KKM	YY	SEQ	DK	GO	GL	FDM	YY	SEQ		YYYY	MM	DD	GS	A	GEB GEW	C	N		S	YYYY	MM	DD	GEWIG	(SM)	

Mother's number

Sire's number

Lamb Number

Birth status
Age of mother

Weight code:
Wean = 2
270 day = 3

Service code:
Natural
or AI

Birth remarks:
Died at birth =4
Mated, no lamb born =20

APPENDIX A
NATIONAL SMALL STOCK IMPROVEMENT SCHEME
REPRODUCTION REPORT

OWNER :
ADDRESS:

DATE : 10/05/2000
MEMBER NR : 123456
FLOCK NR : 4567
FDM : 789
REFERENCE NR : 005990
PAGE : 1

BREED = XXXXX

** 1 EWE ID	2 Poss. Prod Years	3 Times Lambed	4 Number of Lambs	5 Number Weaned	6 **EPI Dev**	7 Mean Lamb Index	8 Age 1st Lamb (months)	9 Inter Lambing Period
888 94 057	3.0	3	4	4	**5**	103	24	367
888 94 059	3.0	2	4	3	**-7**	87	24	729
888 94 066	3.0	3	6	3	**-7**	89	24	367
888 94 067	3.0	2	4	4	**-1**	85	24	733
888 94 070	3.0	3	4	4	**1**	90	24	366
888 94 071	3.0	3	3	3	**0**	116	24	369
888 94 073	3.0	3	5	5	**15**	106	24	365
888 94 076	3.0	2	5	4	**1**	89	24	729
888 94 085	3.0	3	5	4	**5**	103	24	364
888 94 086	3.0	3	7	4	**-4**	74	24	364
888 94 097	3.0	3	4	2	**-7**	131	24	366
888 94 122	3.0	3	5	4	**6**	104	24	373
888 94 125	3.0	3	5	5	**11**	95	24	368
888 94 139	3.0	2	2	2	**-8**	124	24	722
888 94 157	3.0	2	4	4	**2**	94	24	731
888 94 161	3.0	1	2	1	**-20**	109	24	729
888 94 176	3.0	2	2	2	**-9**	123	24	725
888 94 181	3.0	3	4	3	**3**	127	24	364
888 94 187	3.0	2	4	3	**-4**	99	24	725
888 94 192	3.0	2	3	2	**-10**	112	24	715
888 94 196	3.0	3	5	5	**17**	109	23	366

**

1. ID of ewe. Format is Stud number, year of birth and sequence number.
2. The possible number of productive years of the ewe. It is divided into half-year intervals. This is calculated from the last lambing date and the birth date of the ewe.
3. Number of times a ewe actually lambed.
4. Total number of lambs born (dead or alive) to the ewe.
5. Total number of lambs weaned by the ewe.
6. Ewe productivity index deviation. This is calculated from the mean Ewe productivity index (EPI) (see value in "Group Summary Report) for each productive year subgroup. For example, a value of 6 means that ewe's EPI was 6 points above the average EPI for her age group.
7. The mean index of all her lambs. In this case the weights of her lambs were corrected for age and sex.
8. Age at first lambing.
9. Average inter lambing period of the ewe.

APPENDIX B
NATIONAL SMALL STOCK IMPROVEMENT SCHEME
ANIMAL IMPROVEMENT INSTITUTE
GROWTH PERFORMANCE REPORT

OWNER :
ADDRESS:

DATE : 10/05/2000
MEMBER NR : 123456
FLOCK NR : 4567
FDM : 789

BREED = XXXXX SEX = RAMS

1 Animal Id				2 RS	3 Weaning Weight Dev	4 Weaning Weight Index	5 Final Weight Dev	6 Final Weight Index	7	8 **SI%**	9 Scrot Dev		10 Grd	10 Dam ID		11	12 Prod Years		13 Wean	1 **EPI Dev**
O6	98	810	2	-1.40	78	-0.90	95	**89**	-1	C	A6	94	370	1.5	3	**-7**	A6	94	323	
O6	98	858	1	1.50	123	1.70	109	**113**	0	A	A2	95	51	1.5	2	**-13**	O6	97	51	
O6	98	860	2	1.00	116	2.00	111	**112**	-2	C	A2	95	159	1.0	2	**6**	O6	97	51	
O6	98	861	2	1.20	119	2.40	113	**114**	4	AA	A2	95	159	1.0	2	**6**	O6	97	51	
O6	98	863	1	-0.60	91	-1.90	90	**90**	0	B	A2	95	45	1.5	3	**-6**	O6	97	51	
O6	98	869	2	-0.70	89	2.20	112	**104**	3	A	A2	95	3	1.5	4	**5**	O6	97	51	
O6	98	872	2	-1.70	74	-1.50	92	**85**	-3	C	A2	95	523	1.0	2	**-1**	O6	97	51	
O6	98	873	2	-0.60	91	-1.30	93	**92**	1	B	A2	95	86	1.5	3	**-7**	O6	97	51	
O6	98	874	2	-1.60	75	-3.70	80	**78**	3	C	A2	95	86	1.5	3	**-7**	O6	97	51	
O6	98	880	2	-1.20	81	-0.40	98	**92**	-5	A	A2	95	122	1.5	5	**17**	O6	97	51	
O6	98	883	2	0.30	105	1.30	107	**106**	0	A	A2	92	137	1.0	2	**2**	O6	97	51	
O6	98	886	2	-0.30	96	-1.80	90	**91**	2	B	A2	92	186	1.5	4	**5**	O6	97	51	
O6	98	889	2	1.60	124	1.50	108	**113**	1	C	O6	95	10	2.0	3	**0**	O6	97	51	

1. ID of animal
2. Rearing status of animal
3. Weaning weight deviation. This is the first weight recorded for the animal. In this case it was weaning weight. The deviation is the corrected weight of the animal, minus the mean corrected weight for the group, multiplied by the heritability of the trait. In effect this value is a predicted breeding value based on the animal's own performance.
4. Index for weaning weight of the animal. This weight is corrected for management groups, age of the animal, rearing status and age of dam.
5. The same as in 3 for the last recorded weight of the animal.
6. The same as in 4 for the last recorded weight of the animal.
7. Selection index percentage. A selection index (expressed as a percentage) which combines the first and last recorded weights of the animal. Not available if only one weight was recorded.
8. Scrotum deviation. If the scrotum circumference was measured, this is the deviation from the average value of the group.
9. Grade : If the breeder classes the animals in visual groups and submitted it with the weights, this value is then displayed on the report.
10. ID of dam of the animal.
11. Number of productive years of the dam.
12. Total number of lambs weaned by the dam.
13. The Ewe productivity index deviation of the dam.
14. ID of sire of the animal.

POSSIBLE QUESTIONS

1. **Who receives the greatest advantage by buying rams with performance data?**
   The commercial farmer. He is the person that will sell more lambs that grow quicker. The Stud Breeder does not receive a direct gain as he sells the rams and not their produce. However by selling more productive animals to the commercial breeders he ensures his survival as a stud breeder.
2. **If the efficiency of production is increased, what advantages does it hold for a) the breed, b) the breeder and c) the commercial farmer?**
   a) It makes the breed more competitive over other breeds, both locally and internationally.
   b) Not much, except that it ensures his existence as a stud breeder.
   c) He will have a greater income with fewer animals.
3. **Are the selection goals of commercial and stud breeders the same?**
   Although the stud breeder provides animals to the commercial farmer, their breeding goals differ. The breeder must sell his animals and is therefore more emphasis on appearance while measured performance is not as important. The commercial farmer sells products and in most cases appearance is not as important as weight. The breeder sells traits to the commercial farmer that he cannot sell otherwise. If these two segments do not move closer together there is a very good chance that the commercial farmer will look to other breeder or in extreme cases to other breeds.
4. **Can we select for hardiness?**
   No, the heritability of hardiness is zero. We can however select for the components that affect hardiness.
5. **What are the components of hardiness?**
   Breeding rate, growth tempo and survival.
6. **Is it dangerous to select for growth alone?**
   Selection for only one trait always result in a correlated change (some good, some bad) in other important economic traits. Speed of growth can result in lower reproduction rates and poorer survival. Selection for one trait alone, without taking changes in others into effect is not always beneficial.
7. **Can selection mainly for type have negative effects?**
   This can be very disadvantageous. With selection for type there is usually concentrated on traits that are changed easily with selection. These traits are usually influenced by only a few gene combinations. Changes in type can be negatively linked to genes that affect reproduction and production. If reproduction and production are not strictly monitored then losses in these traits can be disadvantageous for both breed and commercial farmer. Changes in conformation can for example decrease the size of the pelvic opening and lead to lambing problems.
8. **Can reproduction be improved with selection?**
   It can be improved by 1-2% per year with selection. Although reproduction has a low heritability, there is large variation which can be utilized and incorporated advantageously into a selection programme.
9. **What is meant with a holistic selection program?**
   This means that we move away from a system where only certain traits are included in a selection programme. This means that we include growth of the animal, the reproduction performance of the ewe as well as type do attain the productive animal that the industry requires.
10. **What is the standard numbering system that should be followed?**
    The stud number (HDM) is not usually imprinted on the eartag, but the year of birth and the sequence number is essential.
11. **For what reason is the standard numbering system important.?**
    In any system where records of animals are recorded, the correct identity of each animal is essential. Not only must your own animals be uniquely identified but they must remain unique among animals of other breeders. When all these animals are placed in one data basis a uniform identification system is of cardinal importance to allow data of animals to be stored systematically, data returned to farmers is readable and also for reference purposes.
12. **An animal's performance in a specific trait is dependant on two components. What are these components?**
    It is determined by the environmental factors (feeding, climate, health, etc) as well the genes that he/she received from both parents.
13. **How can I determine what portion of an animals performance will be transferred to its progeny?**
    Only those traits that are carried in the animal's genes can be transferred to their progeny. It must therefore be determined how his genetic makeup differs from that of other animals for certain traits to be sure that the observed differences are transferred to its progeny.
14. **How can I change an animal's performance the quickest?**
    If you want change it quickly the best is to change its environment. This is the basis for shows, but these differences are not necessarily transferable to its progeny. Where shows play an important role, it is the art of the breeder to master the environment to present his animal at it's best.
15. **If I want to compare animal's performance what is the basic requirement?**
    To compare animals to each other with the idea of determining which will transfer its superiority to its progeny the environment of all must be the same.
16. **What is a treatment /contemporary group?**
    It is a group of animals born in the same 60-day period that have received the same treatment since birth.
17. **What is the minimum number of animals in a treatment group?**

The more the better, but 5 is accepted as the minimum.

18. Name the well-known environmental factors?

19. Birth status, weaning status, sex, animal age, age of dam.

20. What does an index of 108 mean?

If all the animals have received the same treatment, then the animal with 108 index has performed 8% better than the average of the group.

21. How is an index calculated?

The animals own measurement divided by the average of the group multiplied by 100.

22. For which reason is weaning weight the most important weight in the NSSIS?

Weaning weight is firstly used to estimate the reproductive performance of the mother of the lamb. A less important role is to determine the growth potential of the lamb. A more accurate method of determining growth is to use both the weaning and 270 day weight in calculating the potential of a lamb.

23. **Why is it important to record ewes that have skipped or produced dead born lambs?**

24. In the determining of ewe production the reproduction of an ewe is calculated over a period of time. If a ewe has skipped and been culled it is also important to record this to ensure that the **sire of the ewe** is correctly evaluated. If the female progeny of a ram skip or have more dead born lambs this defect will only be noticed if complete records are kept.

25. What does an Ewe Production Deviation (EPD) of 10 mean?

It means that this ewe has produced 10% more kilograms of lamb weaned than the other ewes that have had the same lambing opportunities.

26. What does the Average Lamb index mean?

This is the average weaning index of all the ewe's lambs. It is important to use this index to identify ewes that have many lambs but does not have the mothering ability (milk production) to raise the lambs properly.

27. How is reproduction and production taken into account?

The growth potential of the lamb must be used together with the performance of its mother, who must be above average for the kilograms of lamb weaned.

28. How is type combined with performance and reproduction?

If type is taken into account make sure that the animal has above average performance and that the mother also has above average reproduction figures.

29. What is theminimum Ewe Production Deviation that the mother of a stud ram may have?

Rams that are considered for stud breeding should preferably be progeny of mothers that have an EPD exceeding +5. The absolute minimum would be 0.

30. What are the advantages of BLUP?

Selection is more accurate; animals from different environments can be compared to each other; it gives a genetic "audit" of the stud flock and breed.

31. What are genetic links?

This means that one or more rams have more than 25 measured progeny in more than one environment. These rams, common to both environments, ensure that these two environments are genetically linked and that animals in these environments can be compared.

32. What are the minimum requirements for BLUP?

Accurate record keeping, both parents must be known, genetic links between the different environments.

33. **What makes BLUP different to Indices?**

An index only indicates an animal's own performance in comparison with its contemporaries. A BLUP breeding value takes the animals own performance into consideration **as well as** the performance of it's parents, grand parents etc. **as well as** half brothers, half sisters and especially it's progeny. An index is only an indication of an animals breeding value within a specific group. BLUP breeding values can be compared directly over different environments (provided genetic links exist).