Strategies for Genetic Progress:

A Practical Guide

GenOvis

An essential tool >>>

SECTION 1 >>>
Basic Notions

SECTION 2 >>>
EPDs and Genetic Indexes

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Société des éleveurs de moutons
de race pure du Québec

Cultivons l'avenir 2

Une initiative fédérale-provinciale-territoriale

Canada Québec

Section 1

Basic Notions

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GenOvis

WHAT IS GENOVIS?

- Home-test genetic evaluation program for sheep
- Web-based program updated **weekly**

- Useful for:
  - Purebred sheep breeders
  - F1 producers
  - Commercial producers
  - Dairy producers
- Evaluate the genetic merit of **each breed** of sheep for:
  - Growth
  - Prolificacy
  - Mothering abilities
  - Carcass quality (loin eye thickness and fat depth)
  - Milk production and milk components for dairy sheep (fat, protein, SCC)
- The perfect tool to **improve performance** and make more profit.
  - Evaluate the **genetic merit** of lambs, ewes and rams
  - Evaluate: flock and animal **productivity**
  - Highlight **strengths** and **weaknesses** of the flock
  - Identify **good** and **bad animals** and provide tools to select the best
  - **Mating planner** to control inbreeding and produce genetically superior animals
- A genetic program that **regularly evolves** based on research results.
- **The objective** is the **same** for all **meat breeds: produce more kg of high quality meat.**
- **The objective** is the **same** for all **dairy breeds: produce more kg of high quality milk.**

- The same data must be collected no matter the breed or the cross (exception: milk data is required for dairy breeds). Genetic indexes are adapted to improve genetics according to the breed's needs.

INVENTORY SET UP

All rams and ewes must:

- Have **unique identification**
- Be entered into the database prior to recording lamb data

Data to collect:

For each animal:

- **Unique permanent identification** (tattoo or RFID) of the animal, its sire (if known) and dam (if known)
- Birth date (minimum: year of birth)
- Breed or cross ***(see Appendix 1)***

Fill the **electronic file** or the **printable form** available on the GenOvis website or contact CEPOQ's genetic team.

www.genovis.ca **/ Tools / Data Entry files / Inventory form or Flock inventory**

ALREADY USING AN ON-FARM SOFTWARE?

It may be possible to send your flock inventory directly from your software (e.g. FarmWorks, etc.)
Let us know!

ARE YOUR ANIMALS REGISTERED THROUGH CLRC?

Provide only the registration number and we will use the CLRC website to access all information required.

LAMB DATA TO COLLECT

Basic lambing data information to record:

- Lamb ID, dam ID, sire ID
- Date of birth, Sex
- Number born/weaned
- Disposal date and code (deads, etc.)

Refer to Appendix 2 for the codes to use

Basic weight information recorded to obtain genetic values for growth and reproduction traits:

- Birth weight (kg)
- 50 day weight (kg)
- 100 day weight (kg)

Optional data to record to obtain genetic values on carcass quality:

- Loin eye thickness (mm) and fat thickness (mm).

Measurements may only be collected by accredited technicians.

ALLOWABLE WEIGHING DATES

- At birth (**within the first 24h** of life – not required, but recommended)
- At 50 days (weaning): **28 to 72 days of age**
- At 100 days: **73 to 135 days of age**

>>> All the lambs of a group can be weighed the same day for the 50 and 100 day weighing.

*To plan your weighing, contact the genetic team or use the "**Automatic Weighing Date Calculator**" available on GenOvis website.*

ULTRASOUND MEASUREMENTS

The genetic potential to produce progeny having **high carcass quality** can be evaluated using ultrasound.

Ultrasound technology allows measuring loin eye thickness and fat deposition on live animals.

This service **benefits all the breeds** (terminal, maternal non-prolific and maternal prolific)

AVANTAGES:

- Increase muscle thickness on rams and ewes
- Limit fat deposition on lambs
- Improve the muscular development of prolific breeds (usually poor muscular development)
- **Avoid selecting only on growth:**
    - Done at the expense of muscular development
    - Could increase fat deposition
- Your ewes contribute to 50% of your lamb growth – think about it!

This service is offered to GenOvis members with a few requirements:

* Period allowed: **73 to 135 of age**
* Target an **average weight superior to 35 kg**.
* Service provided by accredited technicians

IMPORTANCE OF DATA RECORDS

Accuracy of genetic values is related to the quality of records.

TO DO:	
Complete pedigree	↑ Links between animals
Known sire and dam	↑ Links between animals
Record all the lambs (alive or dead)	deads = impact on litter size + milk production
Weigh all the lambs	↑ Accuracy of genetic values
Good records of breeding codes (bottle-fed, foster, birth mother)	Could affect dams', and related animals', genetic values
Record birth weight if it can be taken in the first 24h	Improve accuracy of genetic values (EPD birth weight and EPD 50 day weight)
Record required comments and disposal codes	Better overview of the most frequent breeding problems
PLEASE AVOID:	
Weigh / scan only the best performing lambs or record only the animals kept for breeding	Comparisons between only the best lambs– could negatively affect the animals with lower performance (create bias)
Unknown sire or dam	↓ Links between animals, missing pedigree for ewe lambs kept as reproductive animals

GENETIC VALUES CONSULTATION

- **New genetic values available every Sunday morning.**
  Genetic value calculation (main run) is done every week.
- **Various reports** available **at anytime** on your **personal account.**
  Inventory, Lamb Reports, Individual Performance Certificate, Progeny Report, etc.
- **EPDs** for **15 traits** and **6 genetic indexes** available to select on several traits at the same time.

IMPORTANCE OF MANAGEMENT GROUPS

$$P = G + E$$

P : Performance
G : Genetic Effects
E : Environmental Effects

WHAT IS A MANAGEMENT GROUP?

A **group of lambs** that is born in the **same environment,** in the **same period** and will be **raised similarly** *(same building, feeding, ventilation, etc.)...*
*whose **dams** were **bred in the same period** and **using the same technique**.*

WHY SHOULD WE USE IT?

It is the **basis of a good genetic evaluation**. It allows evaluating **differences in performance** between lambs that had the **same chance to perform** (properly **isolate** the **genetic effects** from **environmental effects)** and thus obtain a **good genetic evaluation**.

SOME TIPS TO CREATE GOOD MANAGEMENT GROUPS

PLAN YOUR MANAGEMENT GROUP FROM MATING	
3 rams or more per breeding period (1 ram/ ewe group)	**Paternity should ideally be known** • ↑ rams used in a group = better comparison between progeny performances • ↑ genetic value accuracy • If more than a ram is used in the same pen (unknown paternity), it is still possible to record lambs to obtain genetic values
Expose each ram to an equal number of ewes	• ↑ genetic value accuracy when the number of lambs/ram is similar
Different breeding techniques = different management groups (natural, CIDR…)	• Ewes receiving hormonal treatment = can be more prolific • Not related to their genetic potential • ↓ genetic value of ewe without treatment • Put these ewes in a separate management group
Note the start and the end of mating period	• more than 41 days = comparisons between lamb performance is less accurate (too much age difference) • If more than 41 days = create a new management group

ADJUST YOUR MANAGEMENT GROUP AT LAMBING	
Place the lambs in the same environment	• To remove environmental effects *(building/pasture/temperature/feeding)* • Different environments = different management groups • Genetic effects = performance differences in the same environment • To express their genetic potential = must have the same chance to perform
Avoid preferential treatments with-in a group	• A management group could be located in different pens within the same section of the barn. • All the pens must provide similar conditions (feed, water, hay, space...) • Preferential treatments (more space/ feed) = bias in genetic evaluation
All lambs must be born within a max of 41-day period	• Accurate comparisons between lamb performance • If more than 41 days: create 2 management groups

BASIC RULES FOR MANAGEMENT GROUP CREATION

- A minimum of **2 rams (unrelated), but target 3 or more**
- **Only 1 ram per group of ewes** (to know paternity)
- Minimum of **3-4 ewes bred** per ram
- **Similar number of ewes** for each ram
- A minimum of **10 lambs** of similar breed or cross per sex, sired by **3 different rams** and **weighed at 50 days and 100 days.**
- Record **all the lambs born within a group** (alive, dead, sick) and not only the best of the group or the ones kept as reproductive animals

CHECKLIST FOR RAM SELECTION

1	**SELECT THE BREED OF THE RAM ACCORDING TO YOUR OBJECTIVE**
	. Produce market lambs: **terminal breed** . Produce reproductive ewes: **maternal or prolific** . Produce purebred stock
2	**PAY ATTENTION TO THE RAM CONFORMATION ESPECIALLY IF YOU SELECT REPRODUCTIVE STOCK SIRED BY THIS RAM (IMPROVE FLOCK LONGEVITY)**
	. **Conformation booklet for reproductive animals** . Breed standards for purebred animals (CSBA)
3	**ASK FOR GENETIC VALUES TO INSURE THE GENETIC QUALITY OF THE RAM**
	. **Look at the genetic indexes.** . Use GenOvis mating module .
4	**DO YOU KNOW HIS SCRAPIE GENOTYPE?**
	. Look for RR rams and avoid QQ.*
5	**DO YOU KNOW HIS MAEDI-VISNA STATUS?**
	. Research flocks with Maedi-visna status.
6	**DOES HE LOOK HEALTHY?**
	General condition, reproductive system, body score condition… *Flock general condition, wool appearance, lameness…* *Ask your veterinarian about health status.*

>>> * Avoid QQ genotypes and animals who carry allele V on codon 136 (to validate for genotype QR). Prioritize RR rams to produce commercial ewes.

TERMINAL, MATERNAL NON-PROLIFIC AND MATERNAL PROLIFIC BREEDS

Sheep breeds are classified according to their objective of selection.

TERMINAL BREEDS

The terminal breeds' main purpose is to bring **high growth rate** and **muscular** lambs, while limiting fat deposition, to get an optimal slaughterhouse classification.

- Canadian Arcott
- Charollais
- Dorper
- Hamphsire
- Suffolk
- Texel ...

MATERNAL NON-PROLIFIC BREEDS

The maternal non-prolific breeds produce, on average, **less than 2 lambs/lambing.** They are recognized for their **good mothering abilities**, **good size** and **good milk production**, to produce lambs with a **good growth rate**. The maternal breeds also have **good reproduction abilities** and a few breeds could **be bred out-of-season**.

- Dorset
- North Country Cheviot
- Polypay
- …

MATERNAL PROLIFIC BREEDS

Maternal prolific breeds produce, on average, **more than 2 lambs/lambing**. They are recognized for their **good mothering abilities**, **high prolificacy** and **good milk production**, to produce a **higher number of kg of lamb per ewe/year**. These breeds also have **excellent reproduction abilities** and a few could **be bred out-of-season**.

- Finnish Landrace
- Rideau Arcott
- Romanov
- ….

HYBRIDS (F1 FEMALES)

The maternal prolific breeds cross with maternal non-prolific breeds to produce hybrid (F1) females known to be **excellent breeding ewes** with **high prolificacy** and **excellent mothering abilities**. The **hybrid vigor** from this cross mainly contributes to **improve reproduction performance** (fertility, prolificacy).

- Dorset X Romanov
- Dorset X Rideau Arcott
- ….

>>> Find more information on sheep breeds available in Canada on the Canadian Sheep Breeders' Association website:
www.sheepbreeders.ca.

Section 2

EPDs and Genetic Indexes

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HOW DOES GENOVIS WORK?

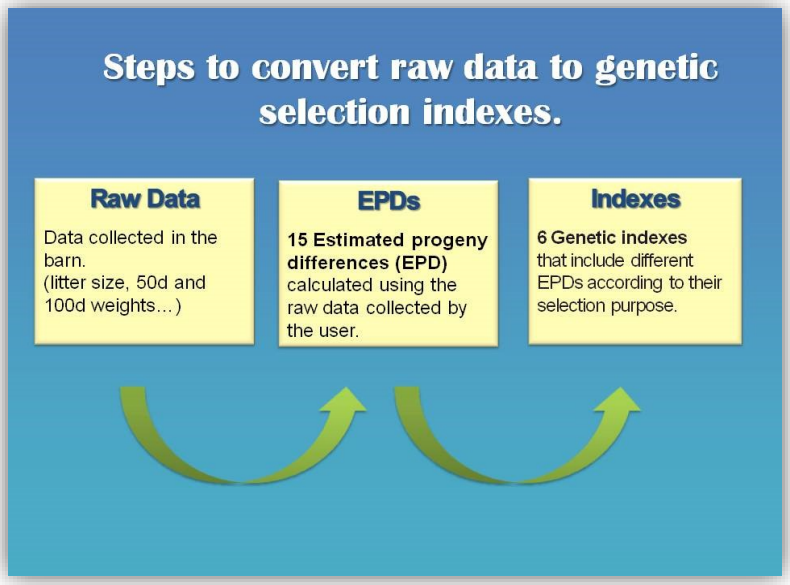
- The genetic evaluation is based on an animal's own performance *(number born and raised, birth weight, 50 day weight (at weaning), 100 days weight (close to 35 kg), loin and fat thickness)*

- The genetic evaluation is also based on its family's performance *(sire, dam, grand sire, grand dam, sisters, brothers, cousins, ...)* and its progeny.

- The animal's performance is compared to the performance of other lambs raised in the same management group.

- The genetic evaluation ***distinguishes environmental and genetic contribution*** to explain animal performance. Furthermore, the genetic links between the traits evaluated are considered by the genetic value calculation.

- The GenOvis program generates **GENETIC VALUES** *(each animal is classified based on its own performance).*



EPDs *(Estimated Progeny Differences)*

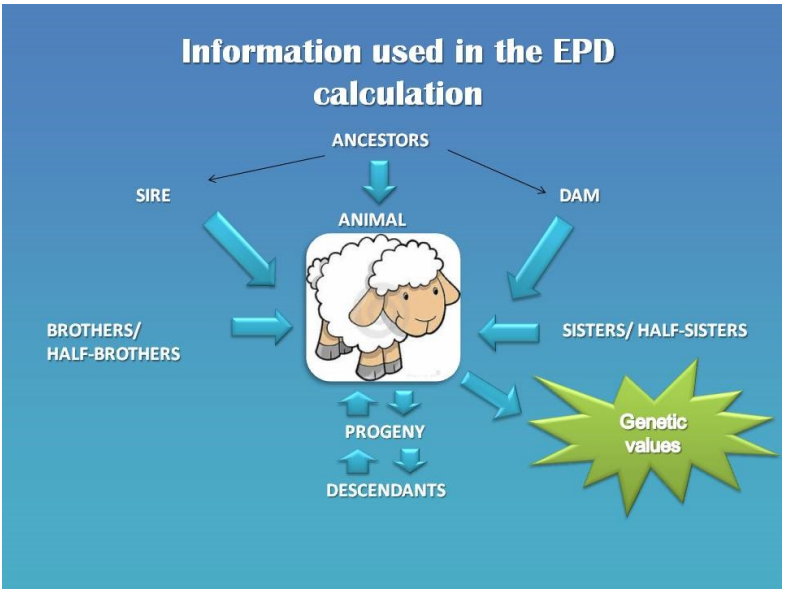
WHAT IS AN EPD?

- EPD – Estimates the genetic potential an animal will pass on to its progeny.
- EPD values are comparable between flocks and also across evaluated breeds.
- Animals with higher EPDs for a trait have higher probability of producing exceptional progeny for that trait.

GENOVIS CLASSIFIES ANIMALS ON 15 DIFFERENT TRAITS USING:

All the data available from *all the flocks evaluated on GenOvis:*

The animal's own performance and those of its parents, grandparents, brothers, sisters, progeny.



15 TRAITS EVALUATED

DIRECT GROWTH TRAITS
(ANIMAL'S OWN GENETIC CONTRIBUTION)

The direct traits refer to the animal's own potential. For example, the EPD 50 day direct expresses the genetic potential of an animal to reach a 50 day weight: this includes its feeding capacity to eat more or less than the other lambs of the group and will result with a superior or inferior gain than the other lambs. It will not take into account the maternal contribution (e.g. good milk production, mothering abilities, etc.)

- *Lamb survival rate (%) (direct)*
- *Birth weight (kg) (direct)*
- *50 day weight (kg) (direct)*
- *Gain 50-100 day (kg) (direct)*
- *Loin eye thickness (mm) (direct)*
- *Fat thickness (mm) (direct)*

MATERNAL GROWTH TRAITS
(DAM GENETIC CONTRIBUTION)

The maternal growth traits refer only to the genetic contribution of the dam to explain lamb performance. For example, the EPD 50 day weight maternal evaluates the dam contribution to allow lamb performance: her milk production, mothering abilities, care provided, etc. The dam uterine capacity will also affect lamb survival rate and birth weight.

- *Lamb survival rate (%) (maternal)*
- *Birth weight (kg) (maternal)*
- *50 day weight (kg) (maternal)*

EWE PRODUCTIVITY TRAITS

- *Age at first lambing (days)*
- *# Born at first lambing (lambs)*
- *Total weight weaned at first lambing (kg)*
- *# Born later lambing (lambs)*
- *Total weight weaned at later lambing (kg)*

EPD UNIT OF EXPRESION:
depends on the trait being examined

EPD	What you are looking for…	Unit
EPD 50d weight	Good weight!	+ kg of weight
EPD nb born	Higher prolificacy	+ lambs born
EPD gain	Good 50-100d ADG	+ kg of weight
Loin depth	More muscle	+ mm of meat
Fat deposition	Not too fat	- mm of fat

GENETIC POTENTIAL: HOW DOES IT WORK?

The GenOvis program evaluates **genetic potential** for 15 traits that could be **passed on to the progeny**.

The genetic potential of a lamb is the **sum of its parents' genetic potential** for a specific trait.

The value obtained allows **positioning the lamb's genetic potential compared to the average performance of 2010 animals** (lambs born /ewes that lambed in 2010).

In that way, if the sum of the parents' genetic potential is +1.40 kg for EPD 50 day weight, then the progeny from this breeding will have a **genetic potential of 1.40 kg more at 50 days than the average of the lambs born in 2010**.

On the other hand, if the sum of the parents' genetic potential is -0.28 lamb for EPD number born later, than **the daughters from this breeding will have a genetic potential to produce 0.28 lamb less than the average of the ewes that lambed in 2010** (less prolific than the average of the ewes that lambed in 2010).

EPD ? ... How does it work?

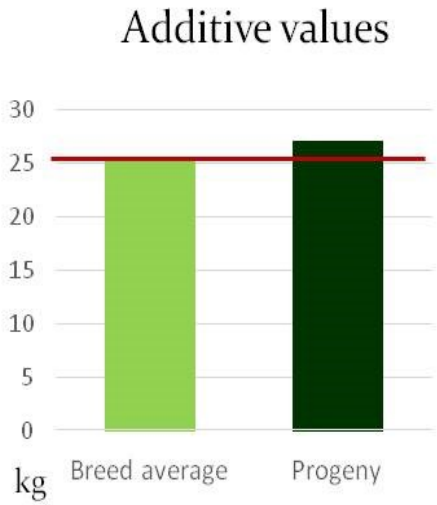
Growth traits

X

EPD 50 days = 1.20 kg

EPD 50 days =0.20 kg

Performance estimated for the lambs of this mating (1.20 + 0.20) = + 1.40 Kg



Reference population: Suffolk breed (2010)

So the lambs from this breeding will have the genetic ability to weigh, at 50 days, **on average**, 1.40 kg more than the average 50 day weight of their breed.

EPD ? ... How does it work?
Maternal traits

X

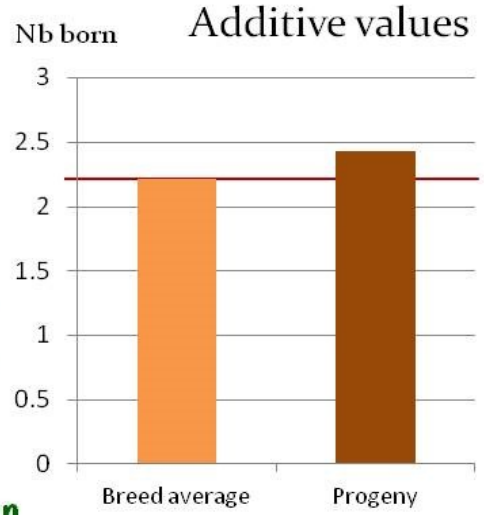
EPD nb born = +0.18

EPD nb born = +0.05

Performance estimated for the lambs of this mating

+0.18 + 0.05

= + 0.23 lambs born



Reference population:
Rideau breed (2010) = 2,22 lambs born/lambing

So the daughters born from this breeding have the genetic ability to produce, **on average**, +0.23 lambs more than the average number of lambs born for their breed.

HOW TO KNOW IF AN ANIMAL IS IMPROVER LOOKING AT ITS EPD VALUES?

We are looking for **positive values for all the EPDs except**:

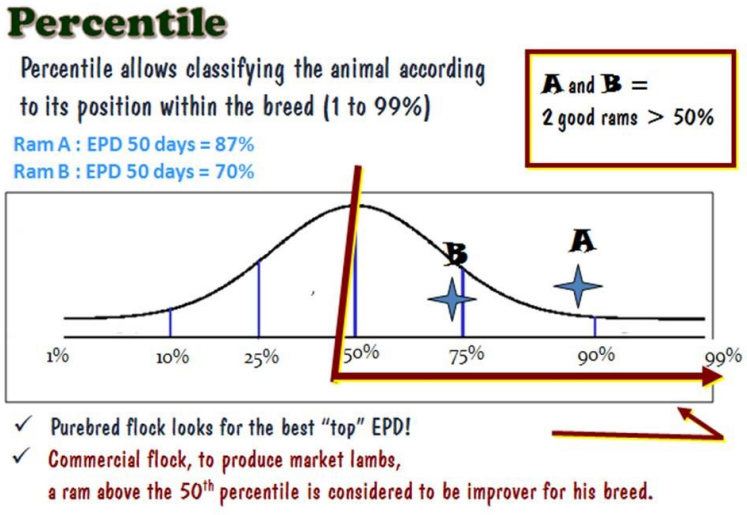
- Lambing interval
- Age at first lambing
- Fat thickness
- Birth weight

For these 4 EPDs, **negative values are wanted**.

THE PERCENTILE… AN ESSENTIAL PART OF SELECTION

The percentile ranks the animal within its population according to its EPD values. At a glance, you will know if the animal is improver or not for the breed.

<50%: below the average / 50%: breed average / >50%: improver



ACCURACY

- An **indication** of the **EPD** value **reliability**.
- An **indication of the number of records** included in the EPD calculation for each trait.
- Expressed from 0 to 100%.
- **Higher accuracy** means that **EPD** will remain **more stable** in time.
- **Lower accuracy = EPD value could have higher fluctuation** when new information is recorded in the genetic program.
- The more animals and bloodlines evaluated by GenOvis increases the genetic value's accuracy.
- Growth traits have higher heritability so their accuracies increase quicker than maternal traits.

EXAMPLE: AN ANIMAL HAVING AN ACCURACY OF 5% FOR EPD 50 DAY WEIGHT DIRECT MEANS:

- The genetic value of this animal could fluctuate in time when new information is recorded in the database.
- Regardless of the EPD value, the fluctuation could result in either higher or lower value.

On the other hand, an animal having a high accuracy (e.g.: >50%) will maintain its genetic value over time.

If the animal has a good genetic value, there is a low probability that this value will deteriorate or improve over time.

The EPD fluctuation will be low with 50% accuracy and very low with 90%.

>>> The EPD is always the best indicator of the genetic potential of an animal even if the accuracy is low (the EPD considers all records available).

IMPORTANCE OF PARENTAGE LINKS BETWEEN ANIMALS

The genetic program takes into account an animal's performance and those of its relatives.

- Known paternity improves genetic evaluation accuracy.
- Complete the pedigree when information is available = increases the links between animals within a flock and also across the flocks.
- The more information available, the more reliable the genetic values will be.

HERITABILITY

- Measure the transmission level of a trait from parents to offspring.
- A high heritability for a trait means:
    - Faster genetic progress
    - Genetic values with higher accuracy (reliability) (e.g. EPD)
    - A higher weight within the genetic index (more importance)

GROWTH TRAITS
(ADG, carcass quality...)

- Medium to high heritability
- Fast improvement of genetic potential

MATERNAL TRAITS

(prolificacy, fertility, breeding out-of-season capacity...)

- Low heritability
- Slow improvement of genetic potential
- Requires many generations to achieve significant progress
- Require more records on relatives (e.g. many descendants' performance) to obtain accurate genetic values.

EXAMPLE: LACAUNE (FRANCE) – IMPROVING NUMBER BORN PER LAMBING

- 1.6 to 2.0 lambs born/lambing in 17 years of selection
- +0.02 lamb/lambing/year

CORRELATIONS

- The links between traits (genetic and phenotypic (environmental)) are considered in the genetic evaluations.

- Take into account the favorable and unfavorable effects of the genetic potential of a trait on the other traits.

EXAMPLE: fat deposition and growth have an unfavorable genetic correlation. This means by selecting animals based only on growth rate, animals tend to be fatter.

***** Use the CARCASS index *****

- A selection based only on growth does not consider the importance to improve other economical important traits as maternal traits and muscular development.

- The reliability of genetic evaluations for all the economic traits of interest evaluated improves by adding performance measured and recorded on an animal's ancestors, but mainly on its progeny.

The GenOvis program takes into account the performance of an animal, but also those of all animals related to it.

Should we select the twin ram with the highest daily gain?

Twin - 600 g/day

Sire: 400 g/day - Single

Grand sire P : 450 g/day - Single

Grand dam P : 250 g/day - Single

Dam: 400 g/day - Twin

Grand sire M : 350 g/day - Single

Grand dam M : 280 g/day - Twin

Single - 450 g/day

Sire: 650 g/day - Twin

Grand sire P : 650 g/day - Twin

Grand dam P : 575 g/day - Triplet

Dam: 450 g/day - Twin

Grand sire M : 625 g/day - Twin

Grand dam M : 480 g/day - Twin

WARNING, DECISIONS BASED ON THE USE OF RAW DATA CAN BE BIASED:

- A lamb can be born a twin because its mother has been given hormonal treatment.
- A lamb can be born a single because its mother is a ewe lamb or has been bred during a hot period during summer.
- The ADG (average daily gain) of an animal may have been influenced by external factors (heat, coccidiosis, mold, hay, etc).

>>> The GenOvis program calculates genetic evaluations based on data collected from an animal, but also its relatives and offspring. The genetic value of an animal is more reliable than its performance in the barn.

HOW CAN WE MAKE A GOOD SELECTION USING SO MANY TRAITS?

- The **genetic index** allows selecting on several different economic traits at the same time.

- The traits are balanced within the index based on their economic value used in the model, their heritability and their genetic and phenotypic correlations.

>>> *REMINDER:* Selection based on only one trait is done at the expense of other traits of interest *(favorable and unfavorable correlations between traits)*

Each genetic index = own goal *(balanced to result in optimal genetic progress on each trait)*

WHY TRY TO INCREASE THE NUMBER BORN AT FIRST LAMBING UP TO 5 LAMBS PER LAMBING IF ONLY ONE LAMB SURVIVES?

- Balancing traits within the genetic indexes allows **selecting on different important traits** using **a unique value** = the genetic index.
- **Selection** is then **more efficient, complete and mainly faster,** as it allows identification of "improver" animals on different traits of interest at the same time.
- There is no more risk of selecting on one trait at the expense of another trait.
- **6 genetic indexes** = different EPD combinations

DIFFERENT GOALS = DIFFERENT RAMS

- Good growth
- Good muscular development
- Optimal fat deposition

- Good mothering abilities
- Good milk production
- Lamb easily
- Heavy lambs at weaning
- Prolific
- Breeding out-of-season

- Breed standards
- Inbreeding level
- Specific purpose for each breed

6 Genetic indexes

Terminal breeds or terminal crosses

- GAIN — No ultrasound — GAIN
- CARCASS — With ultrasound — CARC

Maternal breeds

Prolific breeds

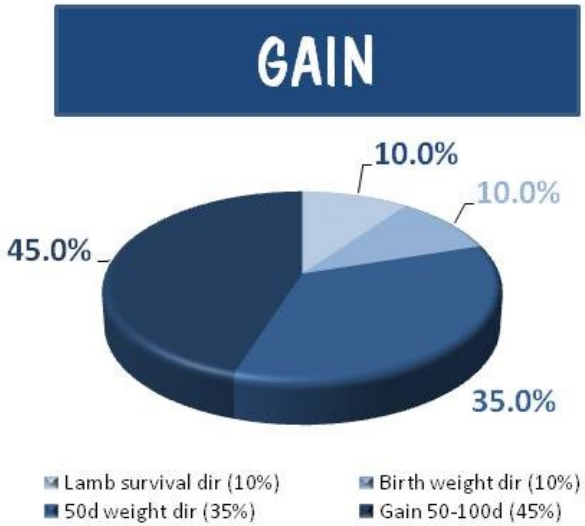
- MATERNAL — No ultrasound — MAT
- MATERNAL ULTRASOUND — With ultrasound — MAT-U

Non-prolific breeds

- MATERNAL HIGHER PROLIFICACY — No ultrasound — MAT-HP
- MATERNAL ULTRASOUND HIGHER PROLIFICACY — With ultrasound — MAT-UHP

I WANT TO PRODUCE MARKET LAMBS.

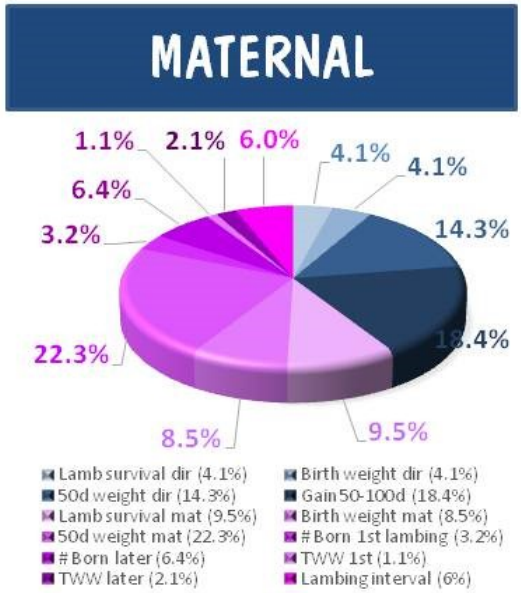
To improve lambs' growth rate.



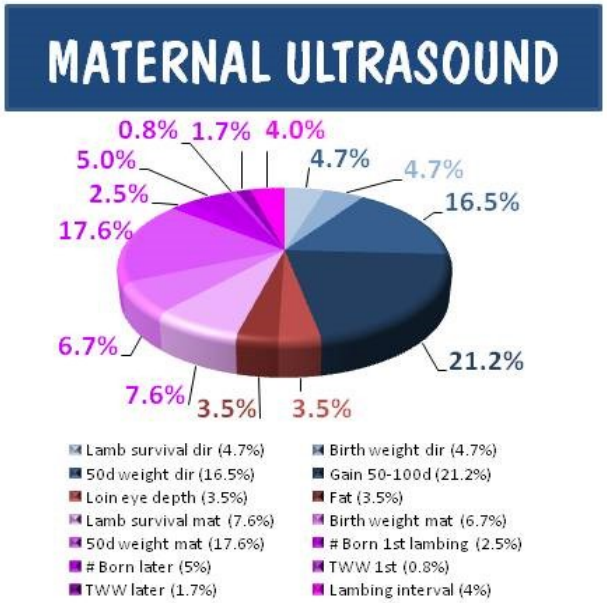
To improve lambs' growth rate and carcass quality

My females are prolific enough, I want to increase my lambs' growth rate.

You want to maintain prolificacy and improve growth

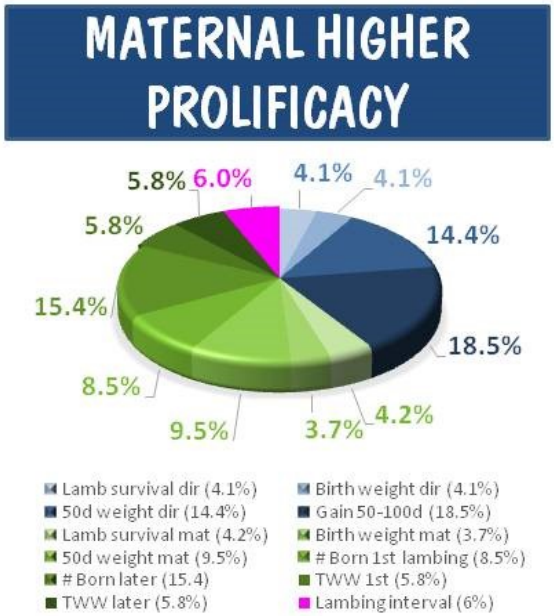


You want to maintain prolificacy and improve growth and carcass quality

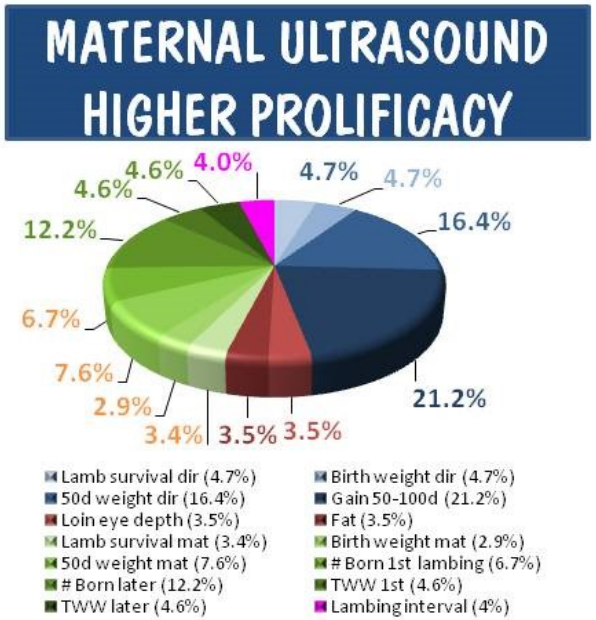


I WANT TO IMPROVE MY FEMALES' PROLIFICACY.

You want to maintain mothering abilities while increasing prolificacy.



You want to maintain mothering abilities while increasing prolificacy and carcass quality



IN BRIEF...

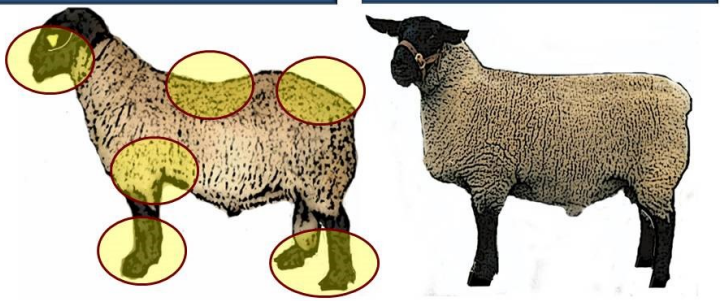
YOU SELL LAMBS ON LIVE WEIGHT BASIS.
• Select a terminal breed • Look at the **CARC** or **GAIN** index • Genetic index percentile >50%
YOU WANT TO IMPROVE LAMBS' GROWTH WHILE MAINTAINING EWES PROLIFICACY.
• For maternal or maternal prolific breeds • Look at the **MAT** or **MAT-U** index • Genetic index percentile >50%
YOU WANT TO IMPROVE REPLACEMENT STOCK PROLIFICACY.
• For maternal or maternal prolific breeds • Look at the **MAT-HP** or **MAT-UHP** index • Genetic index percentile >50%

IMPORTANT REMINDER...

WHICH RAM SHOULD WE SELECT?

Ram A:	
- GAIN INDEX:	92 %
- CARCASS INDEX:	95 %

Ram B:	
- GAIN INDEX:	75 %
- CARCASS INDEX:	72 %



>>> *WARNING:* **Even if ram A has a better genetic potential, he shouldn't be selected as a reproductive ram because of his poor conformation. Ram B is still a good choice, but why not ask for a higher performing ram as a 3rd choice?**

APPENDIX 1
BREED CODES

Breed	Code	Size
ARCOTT - CANADIAN	CD	L
ARCOTT - OUTAOUAIS	OU	M
ARCOTT - RIDEAU	RI	M
BABYDOLL	SD	S
BARBADOS BLACK BELLY	LY	M
BERRICHON DU CHER	DC	L
BLACK WELSH MOUNTAIN SHEEP	BW	S
BLUE FACED LEICESTER	BF	M
BOOROOLA	BO	M
BORDER CHEVIOT	BC	M
BORDER LEICESTER	BL	M
BRITISH MILK SHEEP	BM	M
CHAROLLAIS	CO	M
CLUN FOREST	CF	M
COLUMBIA	CL	L
COOPWORTH	CP	M
CORRIEDALE	CR	M
COTSWOLD	CW	L
DLS	DL	M
DORPER	DO	M
WHITE DORPER	WD	M
DORSET HORNED	DH	M
DORSET POLLED	DP	M
EAST FRIESIAN	EF	M
ENGLISH LEICESTER	EL	M
FINNISH LANDRACE	FN	S
HAMPSHIRE	HA	L
HEXAM LEICESTER	HL	M
HYBRID	HY	M
ICELANDIC	IL	M
ILE DE France	IF	M
JACOB	JA	M
KARAKUL	KK	M
KATAHDIN	KA	S
KERRY HILL	KH	M
LACAUNE	CU	M
LINCOLN	LN	L
MERINO HORNED	MM	S
MERINO POLLED	MP	S

Breed	Code	Size
MONTADALE	MO	M
NEWFOUNDLAND	NF	M
NORTH COUNTRY CHEVIOT	NC	M
OXFORD	OX	L
PERENDALE	PE	M
POLYPAY	PO	M
RAMBOUILLET	RA	L
ROMANOV	RV	M
ROMNELET	RT	M
ROMNEY	RY	M
ROUGE DE L'OUEST	RO	L
SCOTTISH BLACKFACE	SB	M
SHETLAND	SL	S
SHROPSHIRE	SH	M
SOAY	SY	S
SOUTHDOWN	SO	S
ST-CROIX	SX	M
SUFFOLK	SU	L
TARGHEE	TA	M
TEXEL	TX	M
TUNIS	TU	M
WHITE DORPER	WD	M
CROSSBRED UNKNOWN	XX	M

Codes shown on reports

You must not use these codes to enter crossbred animals in the program

Hybrid lambs	HY
Crossbred lambs when the cross is known	XB
Crossbred lambs when the cross is unknown	XX
ZZ (admin GenOvis)	ZZ

How to record crossbred animals

Hybrid (F1)	DP1/RV1
3/4 Dorset	DP3/RV1
Hybrid x Terminal	DP1/RV1/SU2
Crossbred Ewes	XX1

APPENDIX 2
LAMB DISPOSAL CODES

5A	Mummified
5B	Stillborn
5C	Died 0-10 days
5D	Died 11 to 50 Day Weighing
5E	Dies after 50 Day Weighing
5F	Gave Lamb Away
5G	Sold For Slaughter – Stockyard
5H	Sold for Slaughter – Plant
5I	Sold for Slaughter – Local Auction
5J	Sold for Slaughter – Farm Gate
5K	Sold for Breeding
5M	Abortion
5N	Research Use
5Y	Disposed – Unknown Reason

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