THE POTENTIAL OF WALLONIA IN ANIMAL GENETICS

Promotion of the Walloon Animal Productions PROANIWAL ASBL

Genetics and Selection - History of the actions

Several scientific institutions of Wallonia are interested with animal productions since dozens of years, especially the Faculty of Veterinary Medicine of the University of Liege (ULg) and the University Faculty of Agricultural Sciences of Gembloux (FUSAGx). They developed mathematical models of **genetic evaluation of the reproducers** for the beef and dairy cattle (production, conformation-type, economic factors, etc.), utilising and modelling natural and synthetic traits and indexes.

Beside this work, they took part in the improvement of the **Belgian Blue (BBB)** cattle breed, the most muscular cattle, the champion breed in beef prime choice meat production at world level. In Wallonia, the double muscled cattle is also known as "culard".

The responsible gene for the quantity of muscle of this type of cattle was discovered in 1995. It is called MH for "Muscular Hypertrophy" and related to Myostatin locus. This discovery brought ULg world fame owing to the fact it was published in *Nature Genetics*, one of the most prestigious scientific reviews in the world.

BBB animals, carrying the **MH gene**, have very high outputs, and for instance, one bull had the following values: 642 kg at 13 months, 2007 gr average daily gain with a feed efficiency of 4.5 kg concentrate, i.e. only 4.5 kg of grains to make 1 kg of growth.
Belgian Blue cattle has a high quality meat, more tender and with less fat.

In the porcine species, our **Pietrain** pigs are also well known, with their **killing out percentage of 83% in average,** and with a **percentage of greater than 60% of meat and little back fat thickness**. These pigs are used everywhere in the world as terminal boar, or are part of the genome of the boars used in crossbreeding by specialized companies as Hypor, PIC, Agroceres, Dahland …
As Pietrain, born in Belgium in 1926, presented the stress susceptibility (of which thermal stress), the ULg developed a new line completely resistant to stress. It is called **Pietrain Stress Negative (Pietrain^{CC} and Pietrain^{CT},** in relation with Ryanodin locus**)**. These new two types of Pietrain (homozygote and heterozygote) present all the Pietrain qualities, but now without the susceptibility to the stress. The stress negative Pietrain has a future in Europe, as the consumer wishes not to see anymore tranquillising the pigs before the transport.
At the ULg, there are currently at disposal more than 800 subjects. The start up company "Animal Breeding Partners LTD" is a joint project with the Detry Group from Aubel, Belgium. The main objective is genetic improvement for a better meat quality with high technical efficiency for excellent commercial profitability.
Since 1995, the CIAP in collaboration with several Walloon breeders and with the counselling of the FVM-ULg, has developed a selection programme of a hyperprocreative stress negative sows' breed (Landrace K+). That programme aims first to the replacement of the sows of the producer's herd (thus in close circuit), but the surplus of produced animals could be sold with a certificate of its genetic value.

In the sheep sector, our **Texel culards** are also well known. They present an average **killing out percentage higher than 52%**, with a **high percentage of meat** and **little fat content.** These sheep are rather unique and usable in a terminal cross with ewes, mainly ewes belonging to prolific maternal lines. This type of crossbreeding is largely used, in particular in Belgium and in England.

The gene, implicated in the quantity of meat of the “Double muscled” Texel, has been discovered by University of Liège. The research joint work with INRA of Toulouse (France) has demonstrated that, as in the BBB, the Myostatin locus was concerned but in a different way since microRNA are involved. The results of the research has been published in Nature Genetics in 2006.

Regarding chicken, the **CoqArd Columbus®** wishes to be also a product of differentiated quality. Recently created (first chicks born on 13th December 2001), characterised by a **firm meat, black legs and a recognisable taste close** to that of wild animals.

The CoqArd is born from a cross between the local Ardennaise breed (stock farm of Dr Detobel, veterinarian graduated in ULg and recognised stockbreeder) and a heavy and slow growth breed. Thus doubling the weight of the Ardennaise, reaching an average of more than 2kg at 84 days, still keeping the typical colours of the Walloon breed, including the lack legs. With that weight of only 7% less than the French Red Label, the chicken CoqArd reaches a very good performance, as it keeps the characteristics of the Ardennaise, mainly the quality of meat and the colour of the breed.

The heterosis effect could not be measured as data on the growth of the maternal line were missing. Nevertheless, when comparing the growth curves, one can conclude that the effect on that growth should be considerable, as the crossbred animals have an average weight almost double the one of the Walloon breed (see figure 1).

Furthermore, it offers a considerable interest for the health due to the balance of fat found in its carcass (Ω3/Ω6=1). This is coming from the Columbus® food that is given to the birds, and that contains this ratio of fatty acids. This fact helps to control cholesterol and lower triglycerides.

The project was launched in collaboration with the University of Liege, Department of Animal Production of the Faculty of Veterinary Medicine (Animal Genetics section), the Faculty of Agronomic Sciences of Gembloux (Economics and Rural development section) and the private food factory Val Dieu (Aubel).

Results of the works in progress in foreign countries

Our working methods proved reliable. We are always interested to share our experience in the livestock breeding goal-oriented management, with a perspective of profit, while integrating nutrition, health, management and genetics in a vast programme of improvement for the bovine, porcine, ovine and chicken productions. We are convinced that if the less favoured countries want to export, they should do it starting from products whose quality is always improving. This is supposing an optimisation of the concerned sectors. Moreover, within the framework of diversification, we can propose alternatives leading to quality, hence to a higher profit. See hereunder, some of our achievements in South America, Africa and Asia.

Bovine production – Crossbreeding Belgian Blue cattle with Zebu Nelore in Brazil (Bahia State)

The crossbreeding of the **BBB with the Zebu Nelore** leads to a type of bovine presenting more muscle and less fat and bone, while observing the local conditions of ranching and environment. It is obvious that this technology transfer requires a certain follow-up.

Results of the slaughter and of the dissection in comparison with Braford are as follows:

Same age (25m), same conditions of growth	**BBB x Nelore**	**Braford**
Live weight at slaughter (average)	539 kg	553.5 kg
Carcass weight	292 kg (+5.4 kg than **ð**)	286.6 kg
Carcass killing out %	54.1 %	51.78 %
Carcass fat	-2.54 % less than **ð**	
Carcass bone	-6.9 % less than **ð**	
Carcass meat	+9.44 % more than **ð**	
Muscle: *Longissimus dorsi*	+47.5 gr than **ð**	-1.13 %
Muscle: *Trapezius, Latissimus dorsi*	+114.6 gr than **ð**	-2.68 %

Crossbreeding Belgian Blue cattle x Zebu Nelore

A crossbreeding experiment of Belgian Blue cattle with Zebu Nelore has been organized in Bahia State (Brazil) in order to compare Belgian Blue crossbred animals with Braford animals (a synthetic American breed obtained from Zebu Brahman and Hereford). All the animals grow in the same conditions (management and pasture).
The results illustrated below show a significant advantage of the Belgian Blue x Zebu Nelore crosses, which has heavier carcasses. The increase of muscle and in parallel the decrease of fat and bone are clearly illustrated in the dissection of the 7th ribs.

Crossbreeding of Belgian Blue x Zebu Azawak in Burkina Faso

The first F1 product [BBB x Zebu Azawak] is born on 04.12.2002 in Ouagadougou. This animal was maintained and fed under normal local conditions. At 4 months, his weight was already 135 kg. This is quite exceptional as this weight is the one for local animals at 18 months.

Belgian Blue cattle x Zebu Gobra in Senegal

Some results

Identity	Date of birth	Age (month)	Breed	Sex	Weight (Kg)	Thoracic perimeter (cm)	Height at withers (cm)
Wayembam	01/12/98	8	BBB x Zebu	M	202	133	104
Wayembam	01/12/98	15	BBB x Zebu	M	509	Slaughtered at 15 months 350 Kg of carcass with a killing out of 68%	

Use of the Pietrain Stress Negative in Asia (Vietnam and Thailand)

In Vietnam, the Stress negative Pietrain is used either on sows of the local breed Mon Cay, or on crossbred sows (largewhite x Mon Cai). The experiments take place with the Agronomic University of Hanoi (UAH).

The cross pigs Pietrain x (Yorkshire x Mon Cai) in Vietnam

In Vietnam, the Stress negative Pietrain pig is also used on crossbreed sows in a two-way cross involving the Stress negative Pietrain and F1 sows (Large White x Mon Cai).

Use of the Pietrain stress negative in Congo RDC

In RDC, a Pietrain nucleus of the stress negative line has been transported from Liège Airport and multiplied, since February 2002, at the Centre Agronomique et Vétérinaire de Kinshasa (CAVTK).

Use of the Ardennaise poultry breed in Congo RDC

In RDC, eggs of a nucleus of the Ardennaise poultry breed have been transported to the CAVTK in 2006 for incubation and hatching.

Use of Texel Double Muscled in Morocco

In 2002, terminal crossbred animals of Texel DM (double muscled) were produced in Morocco. The F1 ewes obtained by crossbreeding between D'Man rams (prolific breed of the oasis) and Timahdite ewes (meaty type breed of the coast), were crossed with Texel DM rams in a 3-way cross. The results show that the terminal products present more meat, less fat and bone with a higher killing out percentage. 3 Texel DM rams were transferred into Morocco in 2003 and the results were certified and confirmed.