

- ✓ Durable, fertile and robust cow
- ✓ The cow for peat meadows
- ✓ A real eye-catcher

Groningen White Headed



History in a nutshell

The Groningen White Headed is a native Dutch breed. First descriptions of this breed go back to the 14th century.

Already in the Middle Ages portraits of red and black White Headed cows were painted. Friesian cattle traders bought White Headed cattle for slaughtering on a cattle market in London at the end of the 19th century. At the start of the 20th century, 90% of all cattle in the Province Groningen existed of White Headed cattle. White Headed cattle was, however, also bred in the Province Zuid-Holland, around Leiden, and along the Rhine in Utrecht.

In other countries (e.g. Ukraine, Africa and Asia) the typical pattern of White Headed is seen as well.

Herd book

The first Groningen White Headed cow was registered in a herd book (NRS, currently known as CRV) in 1875. In 1902 the NRS refused to register red White Headed cattle or cows with white spots on their legs. Because of this, a couple of cattle breeders started a herd book specifically for Groningen White Headed cattle in 1908, the "Groningen Blaarkop Rundvee Stamboek (GBRS)". In 1931, the NRS started to accept red White Headed cattle and the number of members of GBRS decreased. In 1957 the GBRS was disbanded. On October 1st, 1986, the "Blaarkop Rundvee Syndicaat" (BRS) was founded. BRS took responsibility for the availability of enough red and black White Headed AI-bulls. Recently, the activities of BRS were taken over by Vivax Genetics.

In 1975, the population of purebred White Headed cattle was around 20,000 cows (Table 1). In 1999, there were only approximately 830 purebred (87.5 - 100%) White Headed cows left and 15 AI-bulls. In 2004, 1321 purebred White Headed cows were registered and currently the trend in the population size is stable. The percentage of White Headed cattle in the Dutch cattle population has always been marginal, around 5% in 1950 to 1% in 1980.

Table 1. Number of purebred White Headed cows in The Netherlands between 1959 and 2007.

Year	Number of cows (≥ 87.5% White Headed)
1959	14,679
1975	20,000
1980	24,000
1999	830
2004	1,321
2007	1,540

Breed description

The Groningen White Headed is a red or black cow with a white head, a white tip at the end of her tail and with red or black blisters around the eyes. These blisters can be attached to the neck (fixed blisters), or may be loose (loose blisters). The bottom of the belly is white and this goes up to her neck. The

udder is white as well. The legs are colored red or black, with white socks. These socks cannot be higher than the ball joints. White Headed cows have a stature of approximately 130-135 cm with a weight of 550 kg. The White Headed bulls are slightly higher (145-150 cm) and heavier (850 kg). White Headed cattle is known for its strong feet and legs, good fertility, strong udder and high protein content in the milk.

*"The eye-catching appearance is
a treat for the eye"*



Dual purpose

Groningen White Headed is a dual purpose breed, which indicates that both milk production and meat production are important. Within the White Headed cattle, some breeders breed more towards milk production and others put more emphasis on meat. In 1906, the ratio milk:meat was reported to be 40:60. Those White Headed cows were bred more towards meat production. Later on, the ratio milk:meat changed to 60:40; i.e. focused more on milk production. Currently, milk production seems to be slightly more important than meat production, but suckling cows and beef production are becoming more popular now.

Breed conservation

The most important area of breeding White Headed cows is the Province Groningen. However, since mid 19th century, White Headed cows were also bred near the Rhine in the Province Utrecht and around Leiden in the Province Zuid-Holland. Currently, the Groningen White Headed is still bred in the same areas as 100 years ago (Figure 1). The population has never been really big, but could always be maintained. The recent interest in functional traits, like feed efficiency, fertility and health, may offer new opportunities.

“When concentrate will become more expensive and milk prices decline, this will be an opportunity for the Groningen White Headed cattle”



Figure 1. Areas where Groningen White Headed cows live in The Netherlands.

Mid '70s most farmers started using Holstein Friesian (HF) semen from the United States. By crossbreeding White Headed with HF, the milk production increased but the typical appearance of White Headed lasted for some generations. The low milk production (Table 2) was the main reason why the number of purebred White Headed cows declined rapidly and the breed became endangered. Good functional traits like durability, and the fact that the breed is less demanding than other breeds, have never been questioned.

Breed demographics

In order to analyze trends in numbers of purebred and crossbred Groningen White Headed cows over the years, a demographic analysis was performed including all calves born between 1970 and 2005. The population was split in eight classes, depending on the percentage of White Headed genes in each calf that was born (1/8, ..., 8/8). Figure 2 shows the number of calves born per year per class. A strong decrease is seen in the number of purebred (i.e. 100% or 87.5%) White Headed calves born per year since 1980. Since 1990, only 500 100% purebred White Headed calves are born yearly. In 2006, almost 3000 calves carry 50% White Headed genes or less.

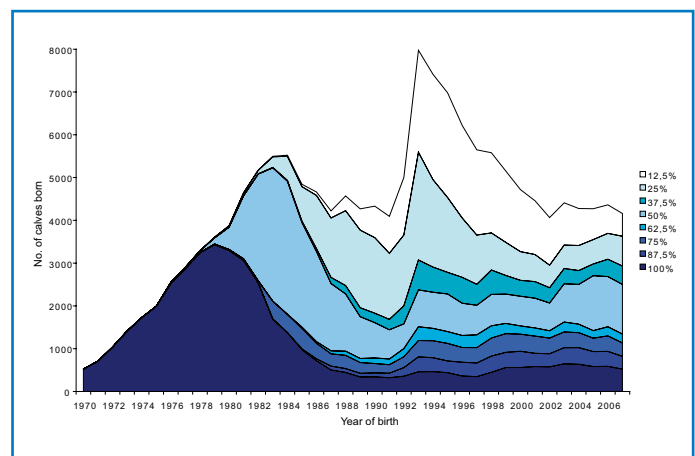


Figure 2. Total number of registered White Headed calves born within each year with 1/8 to 8/8 White Headed genes, between 1970 and 2006.

Table 2. Number of cows and the average milk production and lactation length of several breeds in The Netherlands in 1977 and 2007.

	No. of cows (1977)	Kg milk (1977)	Days in lactation (1977)	No. of cows (2007)	Kg milk (2007)	Mean fat% (2007)	Mean protein% (2007)	Days in lactation (2007)
White Headed	21,272	4930	307	588	6166	4.38	3.57	315
MRY	345,338	5106	309	7,006	6743	4.45	3.63	332
Red Holstein				78,837	8694	4.55	3.57	344
Black Holstein				541,629	9705	4.34	3.48	356
Dutch Friesian	926,956	5234	309	1,029	6910	4.52	3.56	340
Red Friesian	3,834	4859	302					

Artificial insemination

Throughout the years, many good sires are used in the Groningen White Headed population. Before the introduction of AI, individual bulls did not have a major impact on the population, simply because it was hard to travel with the bull, or with the cows. After the introduction of AI this changed, because a selected group of sires became available for almost all farmers. Until 1974 most White Headed farmers chose for natural services instead of AI. When compared to other farmers with other breeds, the percentage natural service remained relatively high for the Groningen White Headed breed (Table 3).

Table 3. Percentage of calves conceived by AI, of all calves born and registered that year.

Year of birth	Dutch Friesian	MRY	White Headed
1950	41	28	12
1955	81	80	22
1960	84	90	31
1965	86	92	35
1970	79	92	47
1974	80	91	41

Genetic analyses

All important sires in the Groningen White Headed population trace back to the sire “Keizer”. In general, because of its popularity, one single AI sire can have a large impact on the offspring born in one year. In 1987 almost 30% of all White Headed calves descended from 1 sire. Figure 3 shows that also in the '90s some sires had great impact by producing many offspring, varying from 10% to 25% of all calves born in that year. Those calves are therefore all halfsibs.

The effect of high percentages of offspring results in an increased average mean kinship of the White Headed population between 1970 and 2007 (Figure 4). The average mean kinship of calves born in a certain year increased up to 2005 and seems to stabilize somewhat since then.

The danger of a high average mean kinship is the risk for inbreeding. Inbreeding can cause unfavorable effects as

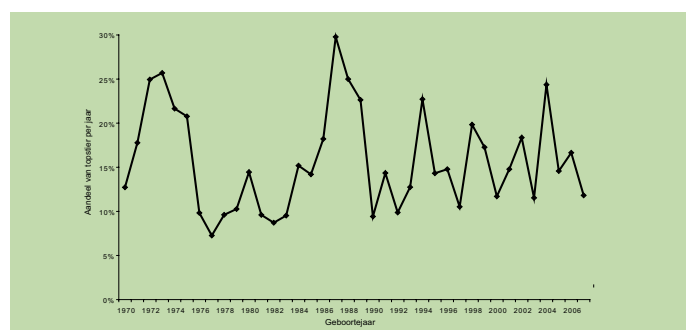


Figure 3. Percentage of offspring of the most popular bull per year as a percentage of all White Headed calves born in that year.

inbreeding depression, health problems or occurrence of genetic disorders. Therefore, it is important to keep the genetic diversity and to maintain certain genes/characteristics within the population. Between 1960 and 2008, semen of 90 White Headed (59 red and 31 black) sires has been stored in the Dutch Gene bank of CGN. This will also help to preserve certain genes for the next generations.

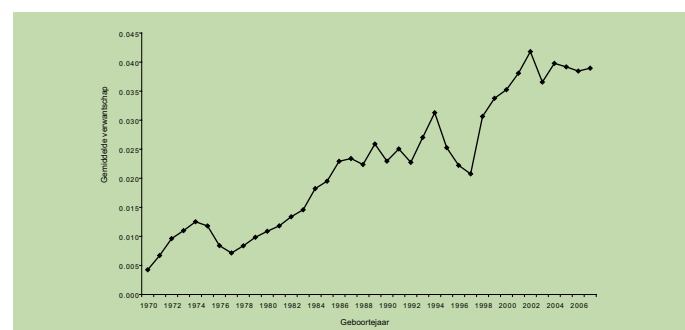


Figure 4. The average mean kinship of the purebred White Headed population born within each year from 1970 and 2007.

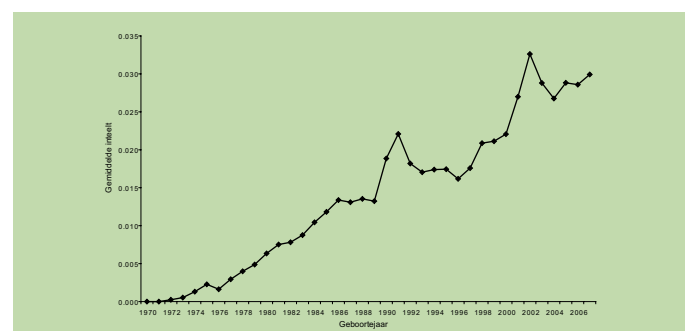


Figure 5. Average inbreeding coefficient of purebred White Headed animals born within each year between 1970 and 2007.

Figure 5 shows that the inbreeding coefficient has increased in the purebred White Headed population over last decades, up to 3% in 2005. An animal is inbred when both its parents are related to each other. To restrict inbreeding, it is important to limit the increase in the average mean kinship of a breed. In general, an increase in inbreeding of 0.5% per generation is allowed. Based on the figures between 1980 and 2005 (Figure 5), the increase of inbreeding is calculated to be 0.09% per year, which amounts to 0.48% per generation assuming a generation interval of 5.5 years.

“In the old days, the White Headed cow was appreciated for her meat quality, but nowadays, she is part of bulk in the slaughter house and appears in the lower price range”

Herd and breed comparison

An important question in the EURECA-project is why some regional cattle breeds still have large numbers of breeding animals, while other breeds decrease rapidly? What considerations may farmers have to choose specifically for White Headed cows, or to continue with another breed (mostly Holstein-Friesian)? What are the strengths and weaknesses of the White Headed cows? We have looked at why some farmers continue to use the White Headed breed, whereas others start crossing with HF or replacing White Headed cattle.

For the EURECA-project we interviewed 23 White Headed farmers, 25 MRY-farmers and 22 Deep Red Cattle-farmers (Table 4). On average, the interviewed White Headed-farmers have 39 cows on 50 ha, of which 39 ha is owned. The MRY-farmers have on average more cows (56) but less land (39 ha, of which 31 ha is owned). The Deep Red-farmers on average have only a few cows (16) on 34 ha, of which 19 ha is owned. The majority (83%) of the interviewed White Headed farmers obtain 75% to 100% of their income from the farm. For MRY and Deep Red the percentage income from the farm are 88 and 23%, respectively. Most Deep Red-farmers obtain a substantial part of their income from other sources outside the farm.

“Wow, that looks nice, such a herd with White Headed cows!”

The average age of the interviewed White Headed farmers is 50 years, with a range between 39 and 61 years. 67% has a Bachelor-degree or lower. The average age of MRY- and Deep Red-farmers is comparable, 52 and 51 years, respectively. The percentage farmers with a Master-degree is higher for White Headed and Deep Red farmers than for MRY-farmers.

All three breeds are dual purpose breeds. MRY and White Headed are mainly used on dairy farms and Deep Red cattle is kept mostly as suckling cows or as free roaming cows in nature reserves. Both the MRY and the White Headed are known for their durability, strong legs (with good claws), good fertility, and high protein content in the milk. All three breeds are calm and strongly muscled. The cows are less demanding compared to high productive breeds.

Farmers' opinion on White Headed breed

Specific characteristics of the breed, like (1) high protein content of the milk, (2) muscularity and (3) less demanding are the most important reason for 42% of all interviewed White Headed farmers to keep White Headed cows.



For 29% of all interviewed White Headed farmers, the income from milk and meat is the second most important reason. Third reason for 33% of the farmers is the nature of the cow; the cows are calm and friendly and easy to manage. Tradition of the family and/or region is also named as a reason to keep White Headed cows on the farm.

Table 4. Overview of herd and farmer characteristics per breed

	No. of herds	No. of cows	No. of ha (ownership)	Contribution to family income	Age (years)	% BSc-degree or lower
White Headed	23	39	50 (39)	83%	50	67
MRY	25	56	39 (31)	88%	52	88
Deep Red	22	16	34 (19)	23%	51	72

Eureca

The EURECA-project (Towards (self)sustainability of EUropean REgional CATTLE breeds) started on May 1st, 2007. Partners from 10 European countries participate in the project (for more information check: <http://www.regionalcattlebreeds.eu/>). The purpose of this project is to learn from each other in Europe to develop better strategies to preserve the regional cattle breeds. In total 15 cattle breeds from 10 different countries are being analyzed in detail; for The Netherlands we have chosen the MRJ, the Groningen White Headed and the Deep Red cattle breeds.

When comparing Groningen White Headed cows with the Holstein-Friesian, the interviewed farmers state that the milk production is low, but the fertility, durability, robustness, health and nature of the cows are scored better than that of HF. The profitability of the White Headed cow, compared to the Holstein, is seen as a plus for 58% of the farmers. But at the same time the interviewed farmers indicate that profitability also depends on the management system.



“Can you earn your money with White Headed cows?!”

Farmers' opinion on their farm

50% of the interviewed farmers do not expect that their herds will grow in the next 5 years. The other half expects to grow, by approximately 75%. 66% of the farmers is not interested in developing other activities and/or specific (niche) products related to the breed. Above all, they are dairy farmers, and those activities cost a lot of time, they say. One third of the interviewed farmers focuses on on-farm sale of milk and cheese and/or of meat to promote the breed.

Inbreeding depression and the limited number of AI-bulls available are seen as major problems for keeping White Headed cattle in the near future. At the same time, the relatively low level of milk production of the White Headed cow will remain a point of concern.

Farmers' opinion on preservation

The specific breed characteristics like fat/protein ratio, feed efficiency, durability, muscularity, health, fertility, nature, strong legs and calving easy should be further exploited. The White Headed cow has wide claws, and is therefore extremely suitable to walk on peak parcels. She is an undemanding cow that suits well as a free roaming cow in nature reserves.

50% of the interviewed farmers indicate that it is important to promote the breed. Also technical assistance with data recording, with registration of bulls and with scientific research on genetic gain are considered as important factors.

According to White Headed farmers, the breed is mostly appreciated by veterinarians, tourists and neighbors that aren't farmers themselves. Holstein-farmers are generally more negative about the White Headed cattle.

White Headed farmers expect more support from breeding- and AI-organizations, and the interviewed farmers would like to see a better promotion of the breed, and they consider this as a duty of the national herd book (CRV). They don't expect any support from consumers and from the local and national authorities, except that they hope that consumers will buy the breed related products. Scientifically, they would like to see more research on biodiversity and the suitability of breeds for certain management systems. Last, but not least, there are also more opportunities to keep White Headed cows for nature and landscape management purposes (nature reserves).

SWOT

Using the information obtained in the interviews, a SWOT-analysis is performed to point out the strengths, weaknesses, opportunities and threats.

Strengths-Weaknesses

The strengths for the White Headed cattle are their functional traits, like strong feet and legs, good fertility, easy calvings, high feed efficiency and robustness. The F1-crossbreeds are very popular because of this, resulting in an increased number of inseminations lately. The cows have a very specific and recognizable appearance. The breed organizations of the Groningen White Headed cattle are very active. They are very active in promoting the breed.

“The wide claw makes the White Headed cow extremely suitable for parcels in peat polder with high water levels”

The most important weakness of the breed is the low milk production and only average quality of the carcass. The cow is small and the conformation of the udder is reasonably but not exceptionally good. Unfortunately, there is a declining number of purebred White Headed cows that participate in milk recording and/or conformation scoring. Therefore, less information on White Headed cattle becomes available for accurate breeding value estimation.

There are only a few good AI-bulls and the genetic variation within the breed is a point of concern. Also the genetic gain per generation is low. These can definitely be considered as a weakness of the breed or as a point of attention.

Opportunities-Threats

The biggest opportunity of the Groningen White Headed cattle is the new interest in functional traits and therefore using White Headed sires for crossbreeding with HF. Farmers are increasingly focused on durability, efficiency, health and fertility, rather than on increased production only. That is why the White Headed may become attractive again.

There is also a big opportunity for White Headed cows on green care farms (nature or landscape management), low-input farms and suckling farms. Developing a niche market for products related to the breed is also an opportunity.

Another threat for the White Headed breed is the small population, with a large risk on inbreeding, and the limited number of



good quality, tested bulls available for breeding. The expected abolition of milk quota, combined with environmental legislation and further emphasis on efficiency of milk production are also considered as threats of the breed.



Conclusions and recommendations

The Groningen White Headed cow has many qualities that also gained importance in the recent years. The strong characteristics of the White Headed cow are her functional traits, like strong feet and legs, good fertility and feed efficiency. Milk production, however, stays low when compared with Holstein cows. Recently, an increase in number of inseminations of White Headed bulls is seen, especially used for crossbreeding to improve the functional traits of Holstein cows.

The population size and the lack of genetic diversity remains a point of concern for the White Headed breed. In the last decade a declining number of purebred White Headed calves was born. Inbreeding depression and the limited number of AI-sires are possible threats for maintaining White Headed cattle in the future.

The White Headed cow has a very specific and recognizable appearance. This can be easily used for promotion of the breed, which will result in a broader use. Promotion of the breed is important, but the initiative for this remains with the farmers and breed organizations. Continuation of the breed organizations is therefore highly important.

*“Undemanding, fertile
and robust cow”*



Colophon

This breed assessment is compiled by Yvette de Haas, with help of Rita Hoving-Bolink, Myrthe Maurice-van Eijndhoven, Debbie Bohte-Wilhelmus, Henk Sulkers and Sipke-Joost Hiemstra. More information about the EURECA-project can be found on the website: www.regionalcattlebreeds.eu. Veeteelt and Zwanet Faber are acknowledged for the photos. The farmers, the “Blaarkop Stichting” and CRV are acknowledged for providing the data.

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How to maintain declining Dutch local cattle breeds?

*Yvette de Haas, Sipke Joost Hiemstra, Debbie Bohte-Wilhelmus,
Jack Windig, Rita Hoving, Myrthe Maurice-van Eijndhoven*

Centre for Genetic Resources, the Netherlands
Animal Breeding and Genomics Centre

Introduction



- Animal production in Europe
 - More intensive, more specialized
 - Very limited number of breeds is used (e.g. HF for dairy)
- Local cattle breeds
 - Kept in small numbers
 - Contribution to conservation of genetic resources
 - Linked with local economics, rural cultural diversity and agro-ecosystems

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Groningen White Headed (GWH) cattle



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**Animal Breeding &
Genomics Centre**

Aim of study



Detailed assessment of GWH

- Demographic analysis on pedigree data
 - How many animals are still in population?
- Genetic analysis on pedigree data
 - How much genetic variation is present in population?
- SWOT analysis on interviews with farmers
 - What is opinion of farmers about the breed?

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Genomics Centre**

Data for analyses



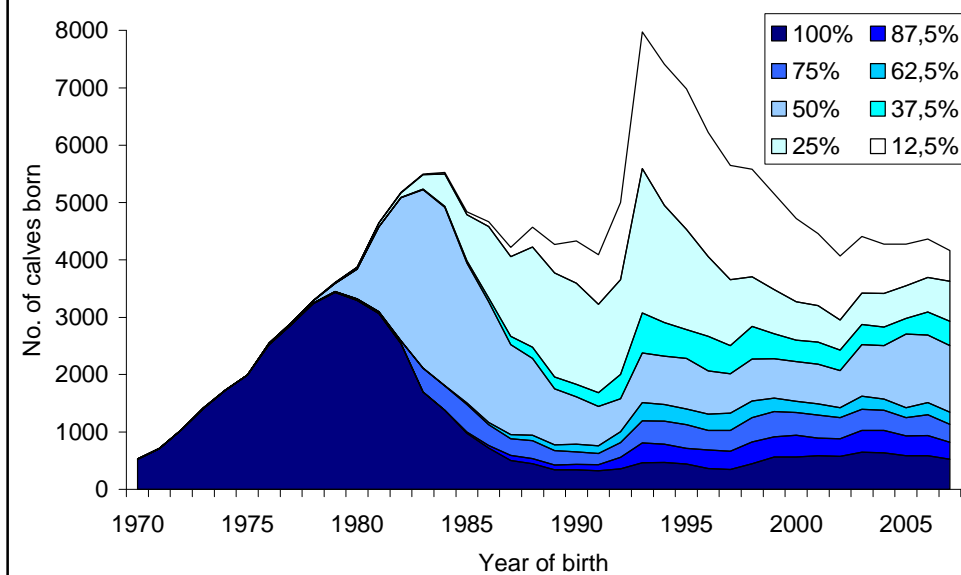
- All calves born between 1970 and 2007
 - 160,169 calves born
- Proportion of GWH genes (1/8, ..., 8/8) per calf
 - 49,026 calves born with $\geq 87.5\%$ GWH genes
 - 2/3 born before 1986
 - 1/3 born after 1986
- Demographic analysis (160,169 animals)
- Genetic analyses (49,026 animals)

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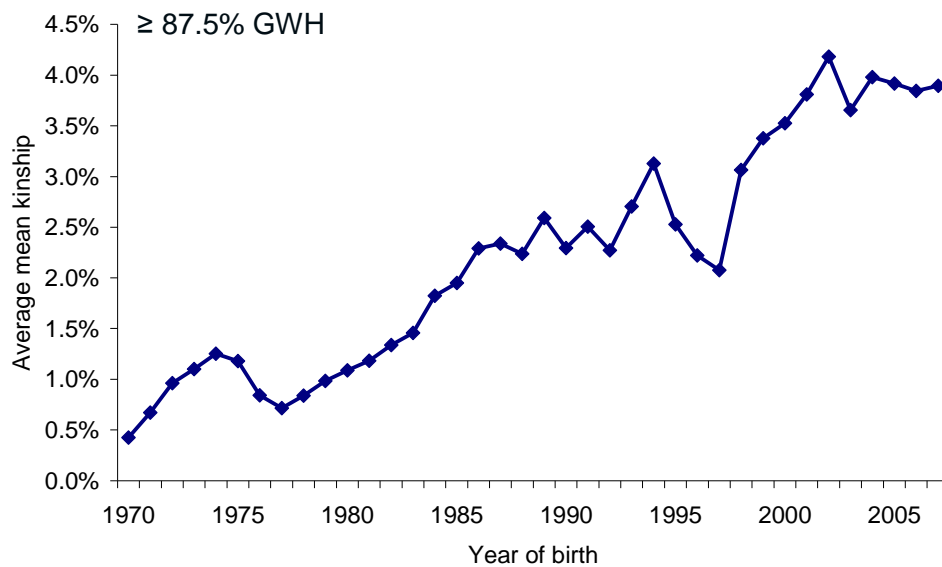


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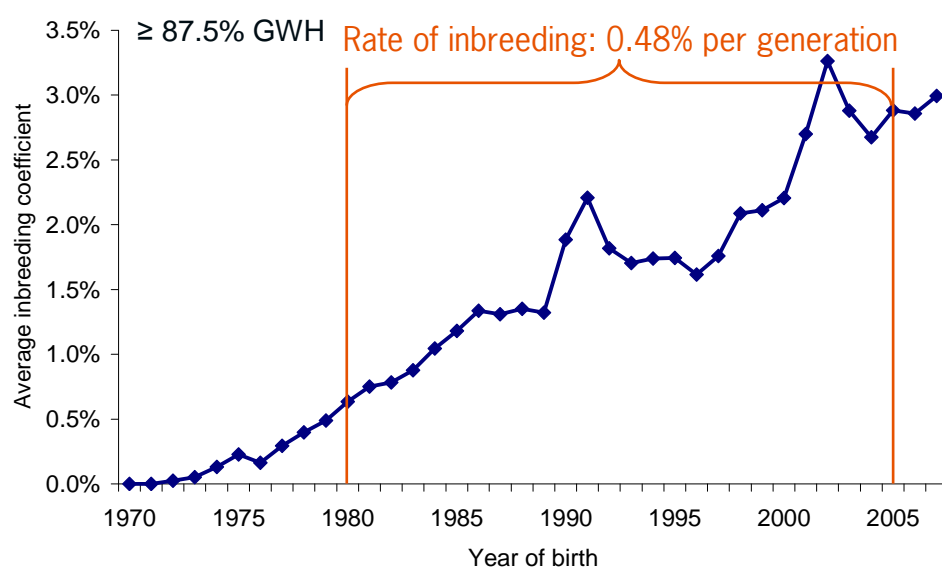
Demographic analysis



Genetic - Mean kinship



Genetic - Inbreeding



SWOT – Strengths & Weaknesses

23 GWH farmers sent questionnaire back

■ Strengths:

- Strong feet and legs
- Good fertility
- Easy calving
- High feed efficiency
- Dual purpose breed
- Robustness
- Recognizable appearance

■ Weaknesses:

- Low milk production
- Conformation of udder not exceptionally good
- Declining recording of data
- Low genetic variation in population
- Limited availability of good AI-bulls

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SWOT – Opportunities & Threats

■ Opportunities:

- (New) Interest in functional traits by farmers
- Crossbreeding
- Low-input farming
- Niche market

■ Threats:

- Small population
- High risk on inbreeding
- Emphasis on efficiency of milk production (specialization)
- Limited no. of good AI-bulls

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Preservation of local breed

How to maintain declining Dutch local breeds?

- Promote the strengths of a breed
 - Increase number of inseminations (purebred & crossbred)
 - Increase number of cows with data recorded
- Use the (strategic) opportunities for a breed
 - Develop structured breeding program – driven by farmers
 - Niche market

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Strategic opportunities

A - Improve breeding program

- Define breeding goals
 - Dual purpose, focus on milk
 - Dual purpose, focus on meat
 - Suckling cows
- Breeding structure

B - Create niche market

- Breed specific products (meat)
- Focus on certain farming systems (e.g. organic)
- Develop chain from breeding to marketing the product

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Breed organization of local breed

Discussions on breeding programs and structures

- Pay attention to genetic gain in population
 - Avoid excessive use of certain sires ('cold sire system')
- Improve the genetic variance in the breed
 - Avoid further inbreeding
 - Apply 'fundament based' breeding system with limited exchange of semen between herds

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- Farmers are acknowledged for the interviews

www.regionalcattlebreeds.eu

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Thank you for your attention



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