2018

Population Report for the Arab Horse Society of South Africa

http://www.talariafarms.com

| Dr Helena Theron, Herman Labuschagne & Frits Voordewind

Photo: Pinterest

Contents

Introduction

Increased selection pressure on many domestic animal species and breeds has led to an increase in production efficiency at the expense of genetic diversity and the survival of many breeds across the world. About 8000 breeds of livestock species have been domesticated, of which 631 are classified as extinct and 1710 are classified as being at risk (FAO, 2011). The concerns with regard to the loss of genetic diversity are however, not only concerned with the extinction of breeds, but also the loss of genetic diversity within breeds. Loss of genetic diversity within breeds can negatively affect adaptation (the ability of a population to respond to natural and human selection) and fitness traits (the capacity to produce fertile offspring). It is therefore necessary to monitor the genetic diversity of breeds to guarantee survival in the long run.

There are several factors that are used as key parameters in monitoring genetic diversity in breeds. These parameters include effective population size, inbreeding levels and average genetic relationships (Groeneveld et al., 2010). Effective management of animal genetic resources depend on comprehensive knowledge of breed characteristics. The availability of pedigree data offers a great opportunity to investigate and assess genetic diversity within a breed. In this study genetic diversity parameters for the Arab Horse population in South Africa were investigated. This will give an indication if the population is at risk of losing genetic diversity or not.

Origin & History

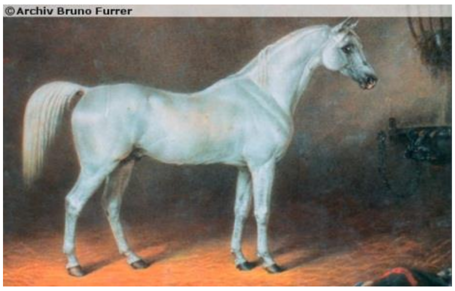
The Arabian horse is a breed of horse that originated on the Arabian Peninsula. With a distinctive head shape and high tail carriage, the Arabian is one of the most easily recognizable horse breeds in the world. It is also one of the oldest breeds, with archaeological evidence of horses in the Middle East that resemble modern Arabians dating back 4,500 years. Throughout history, Arabian horses have spread around the world by both war and trade, used to improve other breeds by adding speed, refinement, endurance, and strong bone. Today, Arabian bloodlines are found in almost every modern breed of riding horse. The Arabian is a versatile breed. Arabians dominate the discipline of endurance riding, and compete today in many other fields of equestrian sport. They are one of the top ten most popular horse breeds in the world (Wikipedia).

The Arab Horse in South Africa

The South African breeders of Arabian horses, geographically isolated from other Arabian breeding nations due to the country's location on the southern tip of Africa, have developed their own unique Arabian population based on English, Egyptian, Russian, Spanish and Polish blood lines. The Arab Horse Breeders' Society of South Africa was established in 1961, and many horses were imported from England, Europe and the United States. Many members have joined as non-breeding members with the sole purpose of owning, riding and showing. Almost all the horses that take part in endurance races are pure or part-bred Arabians. (www.arabhorsesa.co.za).

Data & Methods

Pedigree data of the South African Arab Horse population were obtained from SA Stud Book's Logix data base. The total population consisted of 30 134 animals, born between 1829 and 26 December 2017, of which 16 557 (54.9%) were female and 13 577 (45.1%) were male.



Amurath WEIL 26

Photo: http://www.sukuposti.net

The oldest horse on the data base is a stallion born in 1829 in Germany, named Amurath WEIL 26. The oldest mare is 9 DAHABY, born in Hungary in 1838. These ancestors are pedigree entries; it wasn't until many generations later that their progeny were imported into South Africa.

Population parameters were determined with the German program PopReport (Groeneveld, E., et al., 2009. *Genetics and Molecular Research, 8(3):115*) and the Nordic program EVA (Berg P et al., 2006. *WCGALP, 2006, s.246*), which calculates parameters for monitoring populations for genetic diversity parameters like inbreeding and effective population size, as well as influential animals currently and in the history of the breed. PopRep was developed by the Department of Animal Breeding and Genetics of the Institute of Farm Animal Genetics (FLI). PopRep results are presented in 3 reports, which are also available, and states in detail the methods and results presented in this report. EVA was developed by Peer Berg and Anne Præbel of NordGen. NordGen Farm Animals is a Service and Knowledge Centre for Sustainable Management of farm animal genetic resources (Nordic countries).

Currently Active Breeders & Animals

Currently (06/05/2018), there are 490 active breeders of Arab Horses that have 5 594 animals registered with the Arab Horse Society at SA Stud Book. Arab horses are bred all over the country (figure 1). Figure 2 indicates that there are 3 599 mares (64%), 1 414 stallions (25%) and 581 geldings (11%) active (alive) on the database.

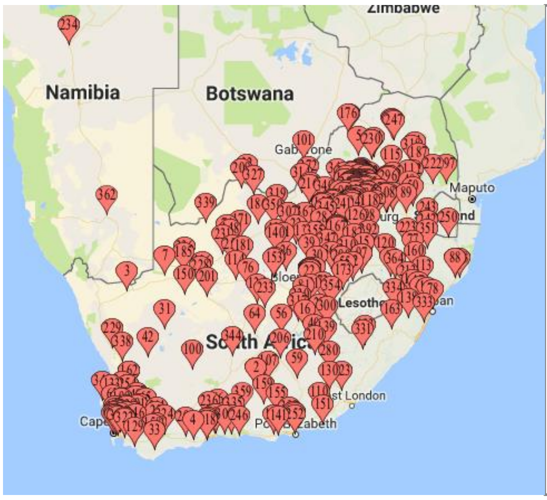


Figure 1: Distribution of breeders.

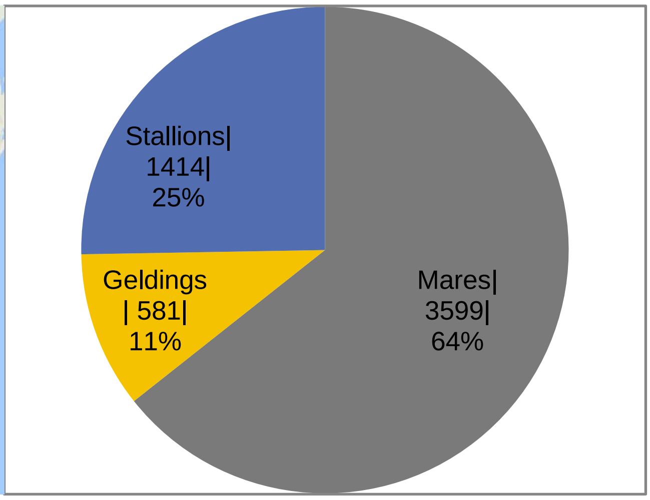
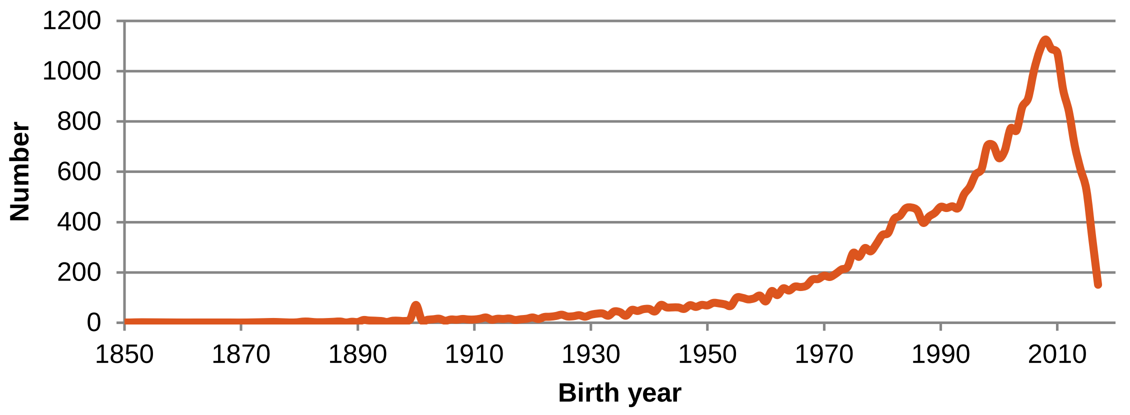


Figure 2: Active Arab Horses registered on SA Stud Book's Logix data base as on 06/05/2018.

The number of Arab foals registered reached a high point of more than 1000 foals registered between 2006 and 2010 (Figure 3). There has been a steady decline in numbers since then. For 2016 and 2017, only 336 and 151 foals respectively had been registered thus far. The low numbers in the past two years may be due to a real decline in numbers or simply late registrations, or a combination of both. The population parameter reports require a full year's foals to estimate the effect of influential animals on the current population (GC and AGR scores). The effect of influential ancestors was thus calculated on the 3-year-old horses (528 registered foals born in 2015), as they are probably more representative of the population than the currently registered 2017-born foals.

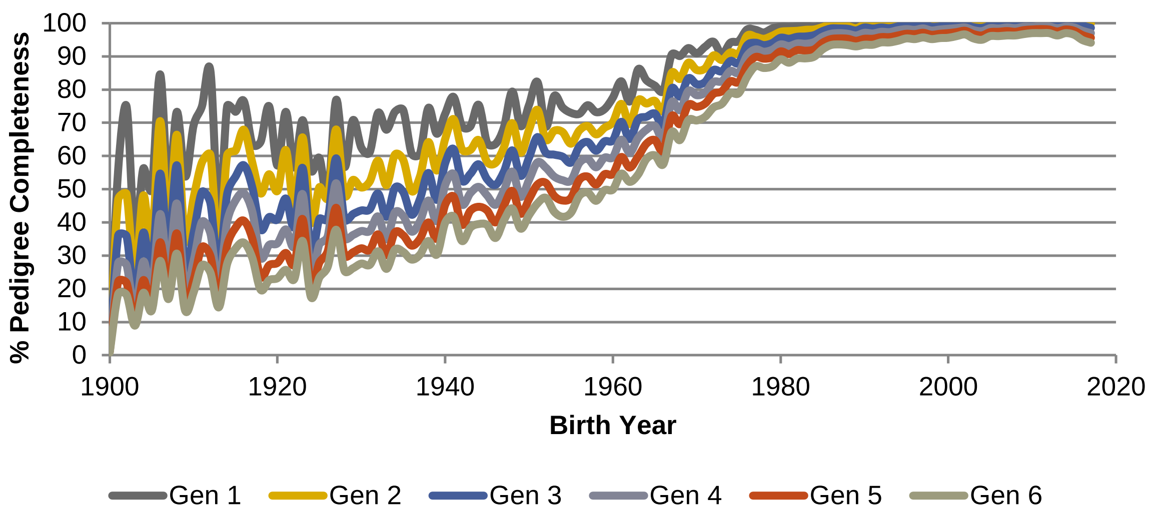
Figure 3: Number of Foals Registered per Year



Pedigree Completeness

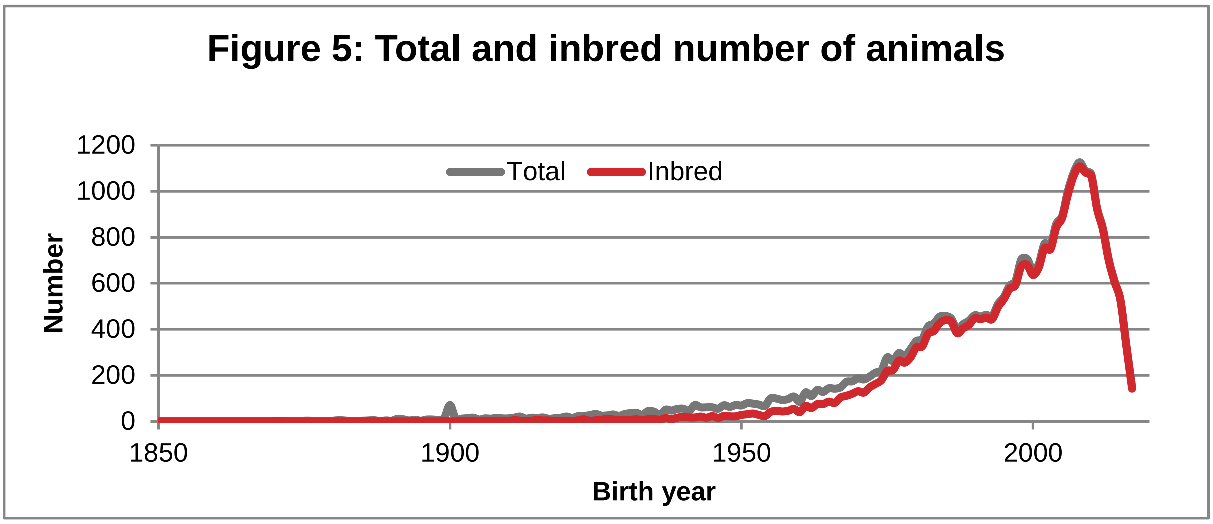
The estimation of inbreeding coefficients is highly dependent on the pedigree completeness of an animal or breed. The more complete the knowledge of an animal's pedigree, the more reliable is its estimate of inbreeding. Groeneveld uses the method of MacCluer et al (1983) to measure pedigree completeness in the breed, which indicates the proportion of known ancestors in each ascending generation. The Figure shows the pedigree completeness for 6 generations deep of the Arab Horse

Figure 4: Pedigree Completeness



population. The average pedigree completeness for animals born within the last 10 years: 1 generation deep (both parents known) = 100%; 2 generations deep (grandparents known) = 99.9%; 3 generations deep = 99.5%; 4 generations deep = 98.8%; 5 generations deep = 97.8%; 6 generations deep = 96.6%. This indicates that the inbreeding coefficients and other population parameters can be very accurately determined for the Arab horse population.

Inbreeding

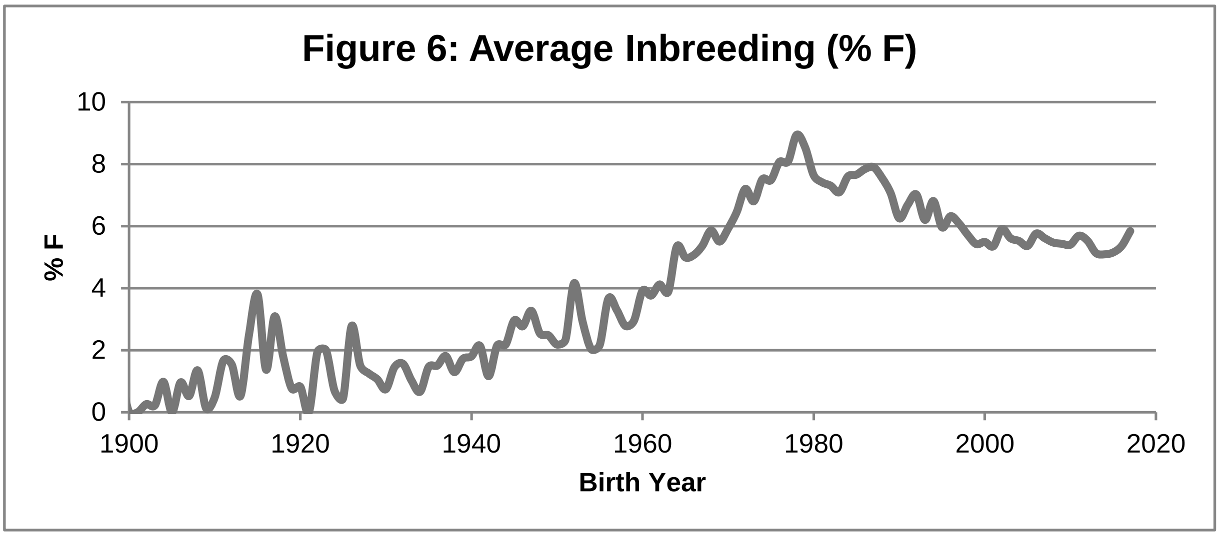


Inbreeding is the mating of related animals. The genetic consequences of inbreeding are that an offspring receives the same genes from both parents because the parents are related, and the genes came from a common ancestor. Inbreeding in a population is measured by the probability that both copies of a gene came from a common ancestor. This is called the inbreeding coefficient (F). The inbreeding coefficient will be higher when the relationship between the parents is higher – it depends on how closely they are related and how many ancestors they have in common. From the Figure it can be seen that nearly all animals are inbred.

Table 1: Total and inbred number, as well as inbreeding coefficients (F) of Arab horses in the last 10 years.

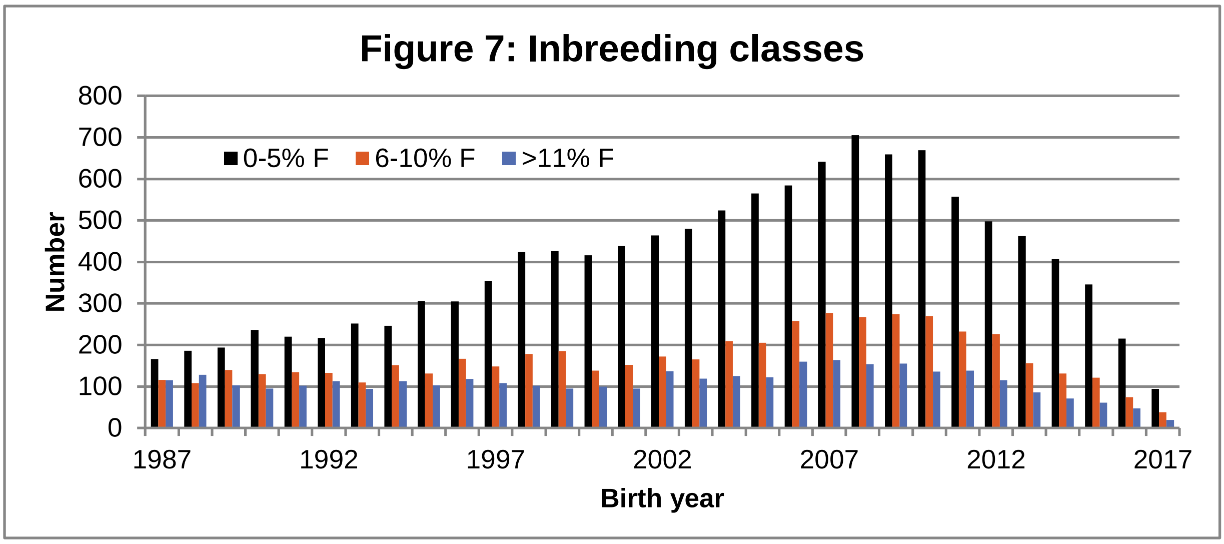
Birth Year	Number	Inbred number	Min F (%)	Max F (%)	Avg F (%)	Std dev.(%)
2007	1082	1068	0	33.18	5.69	5.08
2008	1126	1108	0.06	36.72	5.56	5.49
2009	1088	1081	0.15	37.84	5.47	4.93
2010	1074	1066	0.08	37.84	5.44	5.07
2011	927	923	0.25	37.71	5.71	5.19
2012	839	833	0.05	37.27	5.57	4.88
2013	704	699	0.05	35.15	5.17	4.92
2014	609	606	0.06	29.62	5.12	4.93
2015	528	528	0.01	36.73	5.15	5.18
2016	336	330	0.23	40.53	5.45	5.58
2017	151	142	0.49	37.01	6.21	6.88

Inbreeding is used in livestock breeding to purify the breed, to concentrate 'good' genes and to increase uniformity in the offspring (Gomez et al., 2008).The danger of inbreeding lies there in that it can gradually decrease productivity, fertility and survivability – a phenomenon known as inbreeding depression. Inbreeding does not affect all traits at the same intensity. Traits associated with fitness (lowly heritable) are affected most, such as survivability, mothering ability, growth and reproduction. It can therefore lead to lower conception rates, more abortions, more stillborn and weak foals and a higher susceptibility to diseases. Generally, the effects of inbreeding can become noticeable at an F value of 0.0625 (6.25%), therefore it is generally recommended that individuals should have inbreeding coefficients of less than 6.25%. The theoretical maximum inbreeding coefficient is 50%. However, not all inbred animals show signs of inbreeding depression.



From the figure it can be seen that the average inbreeding percentage in the Arab population was extremely high at 9% in 1978, but that average inbreeding in the population was then brought down to below 6% in 1990 and have remained at between 5 and 6% since then.

With very high pedigree completeness, and a closed population, it can be difficult to keep inbreeding levels within acceptable levels. However, from Figure 7 it can be seen that Arab horse breeders are managing to keep inbreeding coefficients mostly below 6%. There are relatively few animals with very high inbreeding levels.



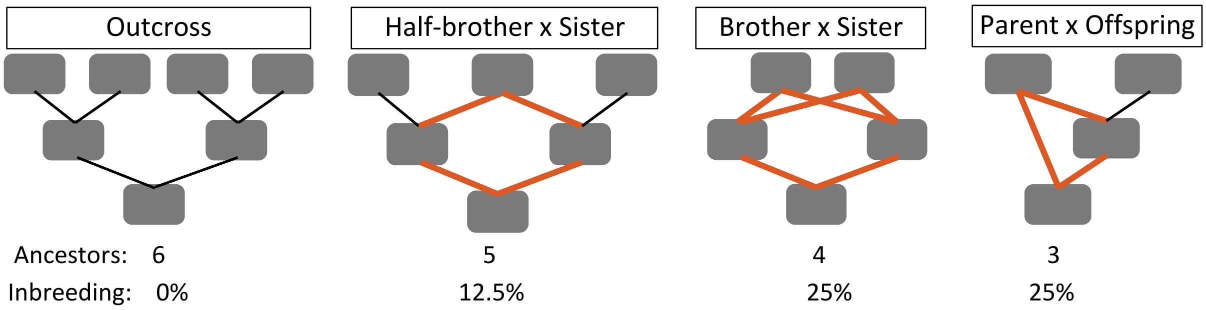


Figure 8: Mating of related animals cause inbreeding to rise and a decrease of ancestors (and genetic diversity). This could lead to a situation where fewer (and only related) animals are available as parents.

Inbreeding that occurs over many generations slowly decreases the number of ancestors represented in the population and genetic diversity therefore decreases. Some valuable genes can be lost during this process. To maintain sufficient genetic diversity in a population, it is recommended that long-term inbreeding should not be more than 0.5 – 1% per generation. However, as Arab breeders has brought inbreeding levels down in recent years, the rate of inbreeding per generation for the Arab population is negative, -0.13%, which is very good.

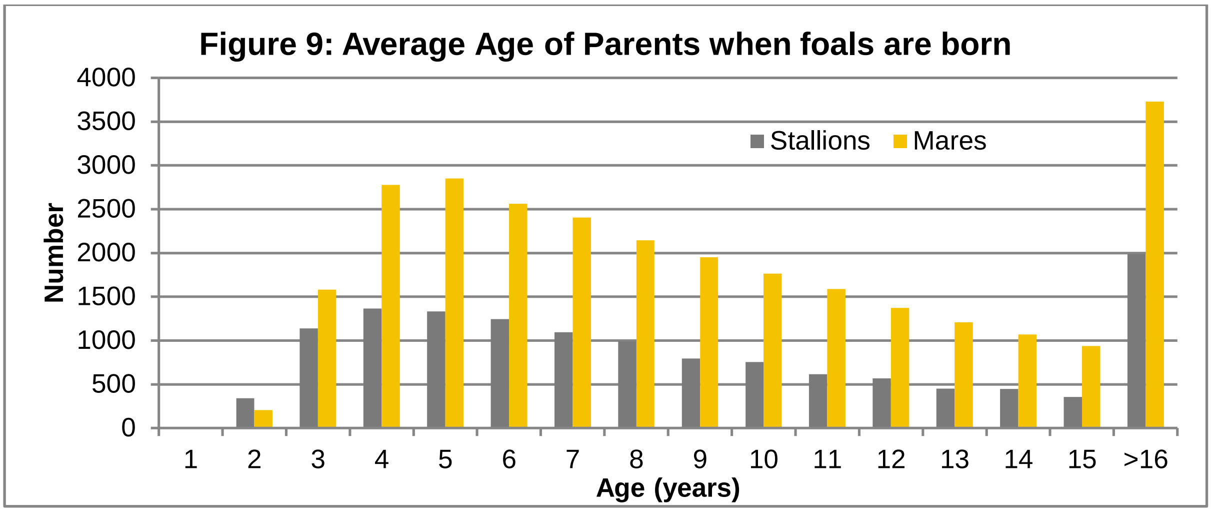
Although levels of inbreeding and rate of inbreeding is thus still within acceptable limits, care should be taken that the situation does not become a problem in future. Arab Horse breeders should continue to avoid inbreeding. Inbreeding can be avoided by increasing the number of individuals contributing to the next generation. The easiest way to do this is to increase the number of unrelated stallions used as sires. Closely related animals should also not be mated. It is recommended that matings where the stallion and mare share more than one common grandparent should be avoided, as the inbreeding coefficient would then be more than 6.25%. This will minimize inbreeding in the short term, but will have no effect if the of animals available as parents, is either too little or too related. In general, limitations should be placed on the level of inbreeding caused by stallions selected into the mating programme.

Effective Population Size

The effective population size is defined as the size of an idealized population which would give rise to the rate of inbreeding in the population under consideration (Wright, 1923). The rate of loss of genetic diversity over time depends on the effective population size which is linked to age structure and mean generation interval of the breeding animals (Engen et al, 2005). In animal breeding, it is recommended to maintain an effective populations size (Ne) of at least 50 (short-term fitness) to 100 (long-term fitness) that corresponds to a rate of inbreeding of 0.5 to 1% per generation (FAO, 1998, Bijma, 2000). There are various methods to estimate effective population size, and most of them are not suitable for the Arab population, due to decreasing inbreeding levels. One method however, proposes an effective population size for the Arab Horse breed of 79 (Groeneveld). The effective population size according to this method thus estimates that the short term fitness is acceptable, but that efforts should be made to use (relatively) unrelated stallions to increase the effective population and therefore long term survival.

Age Structure

The average age for sires is 9.1 years and for dams is 9.8 years. Most stallions and mares are 4-5 years old when progeny are born (Figure 9). Quite a number are older than 16 years, indicating longevity. (The total number of sires and dams is not the sum of the sire and dam columns but rather the total number of sires and dams occurring in all years. This figure will tend to be smaller than the sum from the years, as the same sire or dam may show up in multiple years).



Generation Interval

Generation interval is one of the key factors affecting the rate of genetic progress and therefore the genetic structure of the population. As a general rule, the shorter the generation interval the more rapid is the genetic change in the population holding other factors constant. Generation interval can be defined as the average age of the parents at the birth of their selected offspring (Falconer & Mackay, 1996). In the evaluation of generation interval, an offspring is considered selected if it has produced at least one offspring. The average generation interval for the Arab Horse population in South Africa is 9.9 years, with 10.0 for males and 9.9 for females, which is average, as the average generation interval is 8 to 12 years for horse breeds (Lasley, 1978, *Genetics of Livestock Improvement*; Pjontek et al., 2012. *Czech J. Anim. Sci., 57, 54–64*).

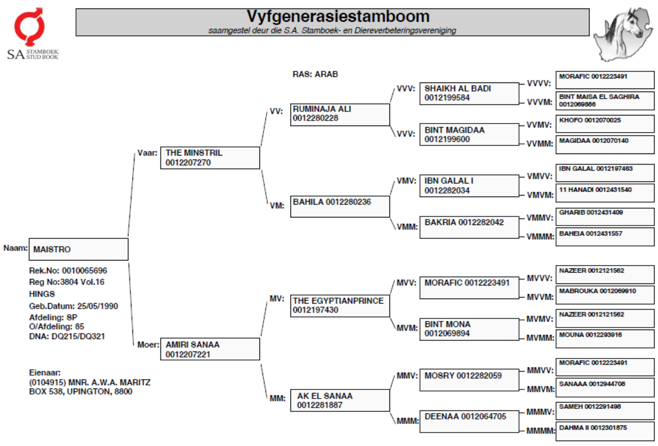
Family size

It is also important to know how many progeny did parents have and which parents made an important contribution in the breed. However, the total number of progeny per parent is not as important as the number of progeny per parent that were again selected to become parents. Family size refers to the number of offspring of an individual that become breeding individuals in the next generation (Falconer & Mackay, 1996). Progeny per sire ranged between 1 and 290 with an average of 7 (SD 13.9). An average of 4 (SD 7.9) progeny per sire were selected to become parents themselves, ranging between 1 and 168. Mares have on average 3 foals (SD 2.8) ranging between 1 and 25 foals. On average, 2 foals per dam (SD 1.6) will be selected to become parents, ranging between 1 and 15.

Important animals in the breed

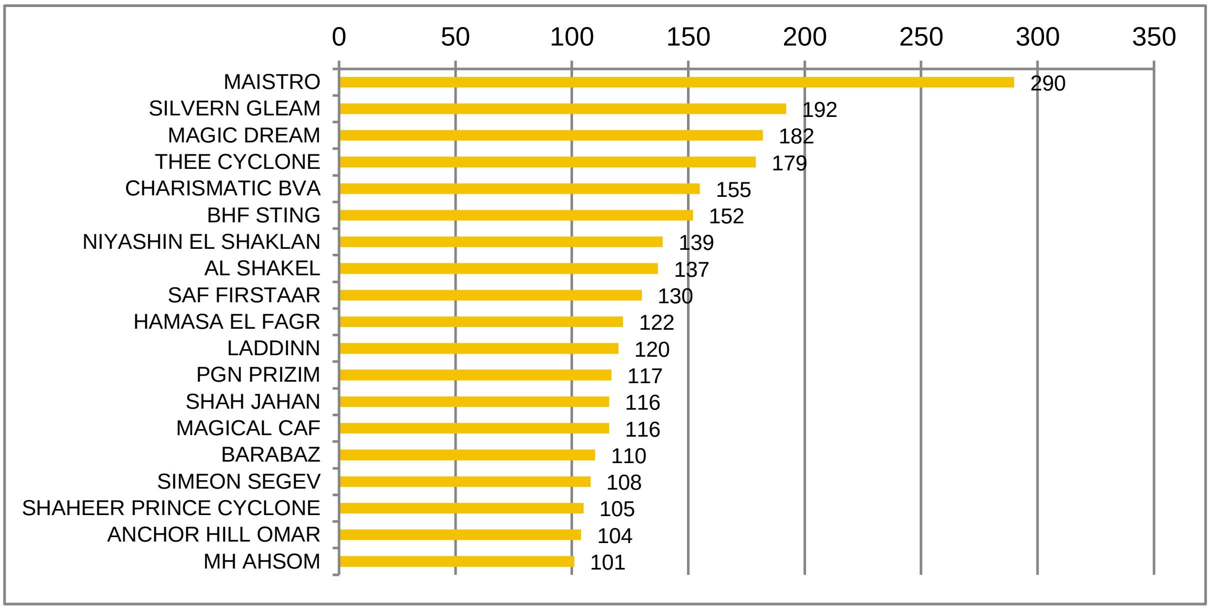
It is also important to identify animals that have made major genetic contributions to the breed. They are identified by the animals with the most offspring in the breed, the most selected offspring in the breed, and the highest Additive Genetic Relationship (AGR) and Genetic Contribution (GC).

The stallion with the most registered foals (290), and also the most foals selected to be parents (169) is the imported stallion Maistro. He was born in 1990 and bred by Sirgard in Texas. An additional 5 stallions have more than 150 registered foals each.



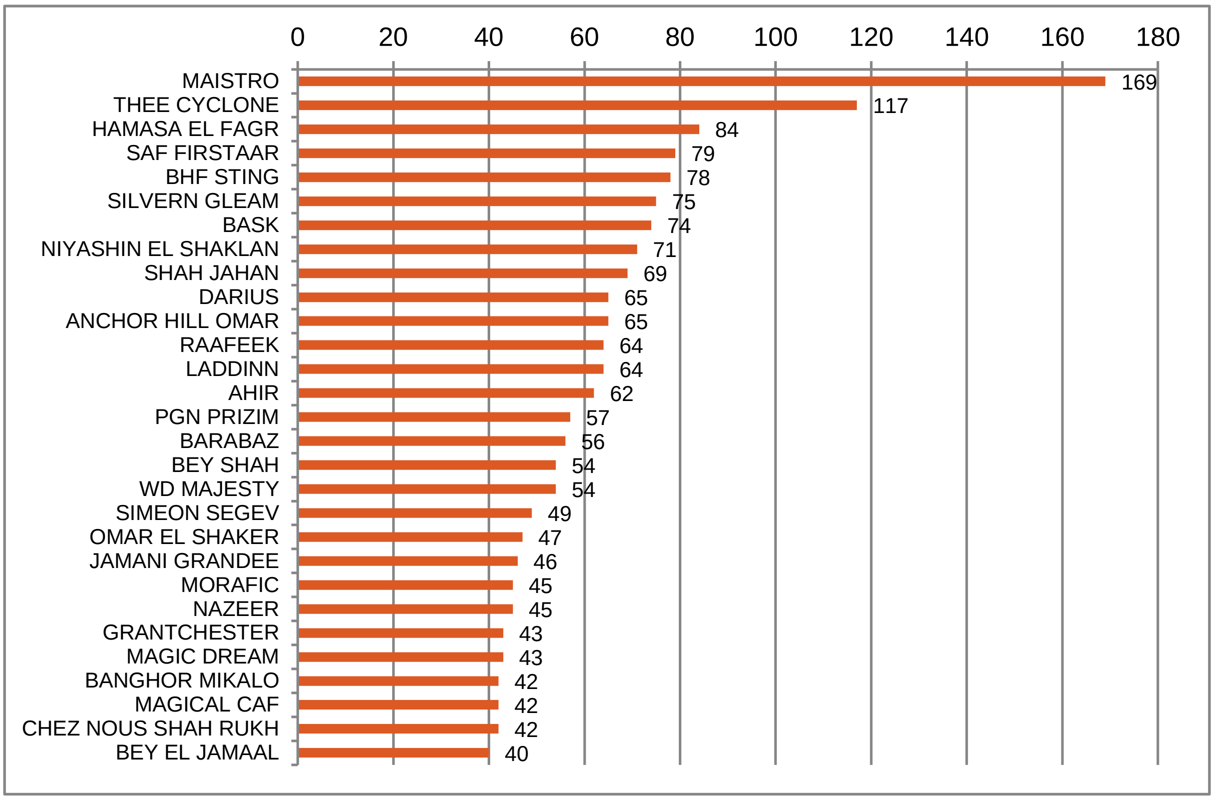
The Logix pedigree report of the stallion Maistro, which is inbred to Morafic and Nazeer.

Stallions with the most registered foals



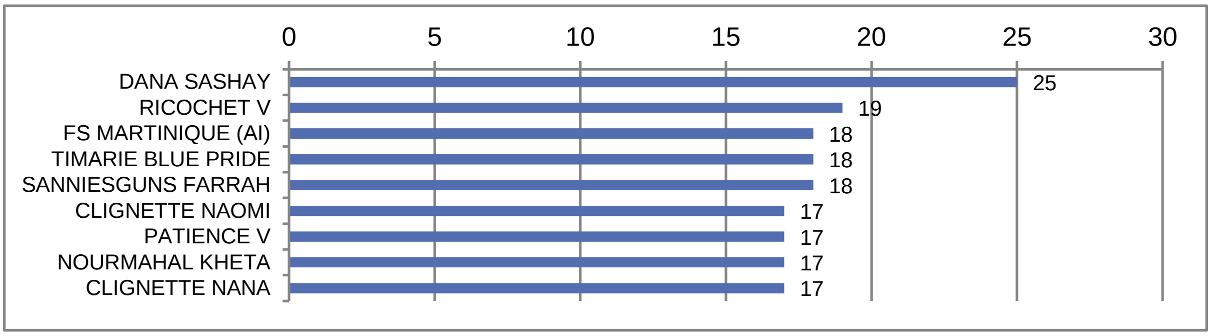
Stallions with the most offspring selected as parents

Even though a stallion may have many registered foals, it does not necessarily mean that he has the largest genetic contribution in the breed, as the number of offspring selected as parents will have a greater influence. The stallions with the most offspring that became parents are as follows:



On the list of stallions with the most offspring selected as parents is Maistro, with 169 offspring, Ahir, a Morafic son with 62 foals, Morafic himself and his sire Nazeer with 45 foals each, contributing to the large effect that they have on the South African population.

Mares with the most foals

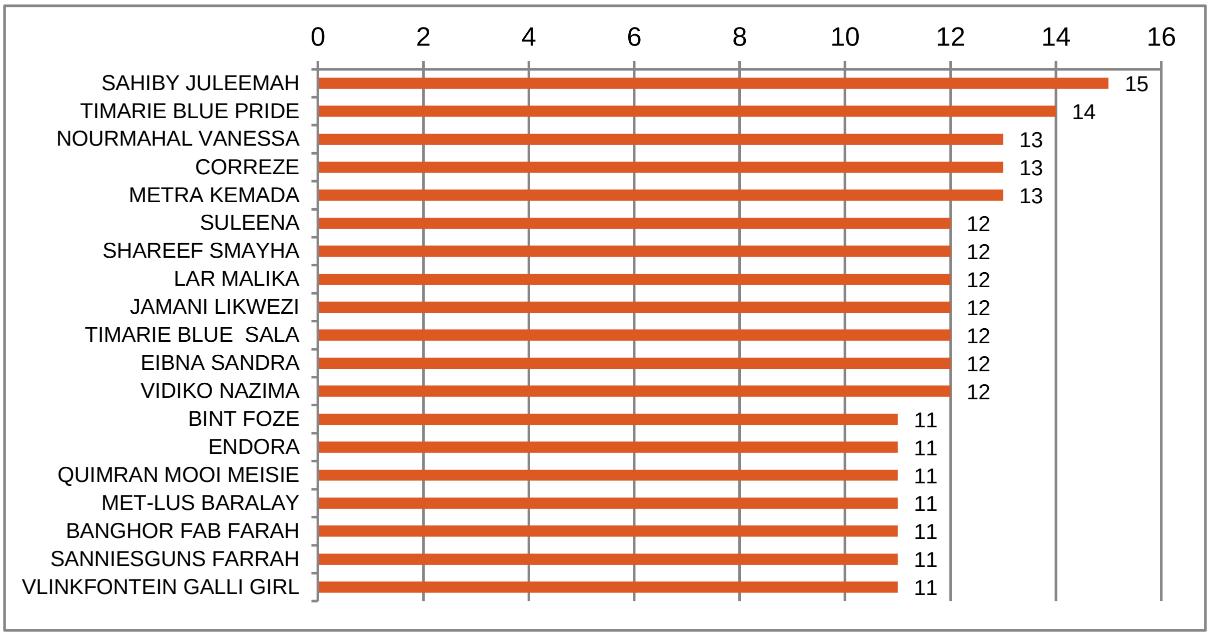


The two mares with the most registered foals, Dana Sashay and Ricochet V, are both imported and registered as ova donors. They are both relatively young (born in 2002 and 2003) in comparison with the other mares on the list.

The two imported mares Dana Sashay and Ricochet V have the most registered foals on the Logix data base. They are both approved ova donors. (Photos: http://www.strydomstud.co.za)

Mares with the most offspring selected as parents



The mare with the most selected offspring, Sahiby Juleemah, was bred by Dr Valerie Noli-Marais of Sahibi stud from a sire-daughter cross, resulting in an inbreeding coefficient of 28%. Her fertility and performance is the best in the breed: she had 15 foals in 15 years, of which all was selected as parents.

Name	Computer No.	Sex	Lab. No.	Registration number	Section	Date of Birth	Sire:	
SIDI BINT JULEEMAH	0011711355	F	DQ727	8348	SP	25/05/2000	MAISTRO	
SIDI EGYPTIAN BELLY DANCER	0011509734	F	Q200828	7735	SP	02/07/1999	MAISTRO	
SIDI EGIPTIAN DESERT	0011318060	M	-	7132	SP	05/08/1998	THEE CYCLONE	
SIDI EGYPTIAN NILE	0011152857	M	DQ2044/501067	6496	SP	28/07/1997	THEE CYCLONE	
SIDI EGYPTIAN NIGHT	0010227577	F	DQ1037	5938	SP	15/06/1996	MAISTRO	
SIDI EGYPTIAN PRINCE	0009953142	M	DQ279	5552	SP	17/06/1995	MAISTRO	
SIDI EGYPTIAN PRINCESS	0009949330	F	Q700096	4922	SP	19/06/1994	MAISTRO	
SIDI EGYPTIAN SONG	0009933441	F	DQ750	4492	SP	10/07/1993	MAISTRO	
SIDI EGYPTIAN KING	0009929522	M	DQ2	3920	SP	07/12/1991	WD MAJESTY	
SIDI EGYPTIAN QUEEN	0009927872	F	DQ605	3458	SP	10/01/1991	WD MAJESTY	
SIDI EGYPTIAN BELL	0009923178	F	-	3169	SP	09/02/1990	WD MAJESTY	
SIDI KAIRO	0009919101	M	-	2642	SP	05/10/1988	SIDI MALIK	
SIDI NOURA	0009915547	F	-	2351	SP	07/10/1987	SAHIBY GAMAAL EL ARAB	
SIDI HALIMA	0009914128	F	-	2201	SP	10/11/1986	SAHIBY GAMAAL EL ARAB	
SIDI MABROUKA	0009912536	F	DQ135	2009	SP	10/12/1985	RAAFEEK	

The Logix report (Enquiries->Animal information -> Progeny) of Sahiby Juleemah's 15 foals.

Influential animals

The most influential animals in a breed are determined by the Additive Genetic Relationsip (AGR) and the Genetic Contribution (GC). Both these scores are related to one another and to the inbreeding of the animal. The official definitions are listed below.

Genetic Contribution (GC)

The proportion of the genes of the foals born in a specific year (2015) that are expected to derive by descent from a **specific ancestor** is known as the genetic contribution of the specific ancestor. It relates to the development of the pedigree over generations and gives an indication of how the ancestor may influence the population. (J. A. Woolliams, P. Bijma, B. Villanueva, 1999. GENETICS 153 (2) 1009-1020). Animals have common ancestors when their common ancestor was popular enough to have multiple offspring, which, possibly after some generations, resulted in the birth of both parents. The more popular a breeding animal was in the past, the larger the chance that two potential parents have this ancestor in common. The more animals share that common ancestor, the larger the chance that mating two animals will result in an inbred offspring. In other words, there is a relation between the long term genetic contribution of an animal to the population and the rate of inbreeding in the population. The genetic contribution is a measure of the level of relatedness between animals in a population because of a shared common ancestor.

Table 2: Animals with the highest Genetic Contribution (GC) in the breed.

Ancestor	Sire	Dam	Sex	Birth Year	F	AGR	GC
NAZEER	MANSOUR	BINT SAMIHA	M	1934	0	11.7	**9.8**
MORAFIC	NAZEER	MABROUKA	M	1956	2.34	12.7	**6.9**
MESAOUD	AZIZ	YAMAMA III	M	1887	0	7.1	**6.7**
MANSOUR	GAMIL MANIAL	NAFAA EL SAGHIRA	M	1921	0	6.8	**6.0**
BINT SAMIHA	KAZMEEN	SAMIHA*	F	1925	0	6.7	**5.1**
AZIZ	HARKAN	AZIZA	M	1881	0	4.1	**4.1**

The animals with the highest direct influence in the South African Arab breed is Nazeer and his son Morafic, which both had many direct offsping in South Africa that were selected to become parents. Mesaoud, the third most important animal on GC, is the stallion that appears in over 90% of all Arabian pedigrees worldwide (http://www.arabdatasource.com; as cited by Wikipedia). Nazeer is also a descendant of Mesaoud, although they are separated by some generations. Nazeer's sire and dam, as well as Aziz, Mesaoud's sire, is also important. Although ancestors are related to one another, GC is shared among many ancestors. The high levels of pedigree completeness mean that these important ancestors are included in current animals' pedigrees.

Additive Genetic Relationship (AGR)

The additive genetic relationship reflects what proportion of their DNA (alleles) animals share because they have common ancestor(s). Additive genetic relationships are calculated from the pedigree. In this report, the AGR was estimated relative to 3-year Arab foals (born in 2015). The additive genetic relationship is an estimate of the proportion of alleles that the foals born in 2015 have in common because of **one or more common ancestor(s)** (https://wiki.groenkennisnet.nl/) .

From Table 3, it can be seen that many important ancestors worldwide also dominate South African pedigrees, as could be expected. Many are related to one another, and they are important in South African pedigrees as well.

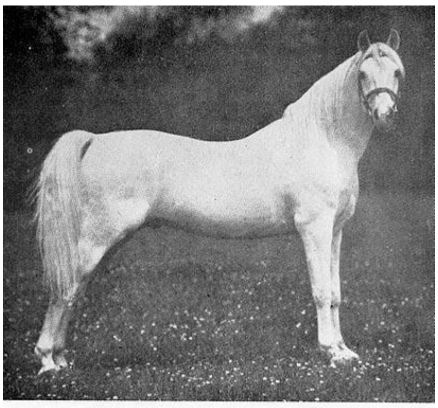
Table 2: Arab ancestors with the highest AGR (Additive Genetic Relationship) to the 528 registered foals born in 2015 (current 3-year olds). GC score (Genetic Contribution) are also shown.

	Ancestor	Sire	Dam	Sex	Birth Year	F	AGR	GC
1	MORAFIC	NAZEER	MABROUKA	M	1956	2.34	12.7	6.9
2	NAZEER	MANSOUR	BINT SAMIHA	M	1934	0	11.7	9.8
3	RUMINAJA ALI	SHAIKH AL BADI	BINT MAGIDAA	M	1976	13.97	11.5	3.3
4	MAISTRO	THE MINSTRIL	AMIRI SANAA	M	1990	10.92	11.0	2.4
5	AHIR	MORAFIC	DEENAA	M	1973	9.17	10.6	2.1
6	THE MINSTRIL	RUMINAJA ALI	BAHILA	M	1984	6.84	9.6	2.5
7	ALI JAMAAL	RUMINAJA ALI	HERITAGE MEMORY	M	1982	0.39	8.7	2.4
8	RAKTHA (GB)	NASEEM	RAZINA	M	1934	1.95	8.4	3.1
9	PADRONS PSYCHE	PADRON	KILIKA	M	1988	2.56	7.8	3.9
10	PADRON	PATRON	ODESSA	M	1977	1.51	7.5	2.3
11	RAZINA	RASIM	RIYALA	F	1922	9.38	7.4	3.2
12	MESAOUD	AZIZ	YAMAMA III	M	1887	0	7.1	6.7
13	RISALA	MESAOUD	RIDAA	F	1899	0	6.9	2.8
14	MANSOUR	GAMIL MANIAL	NAFAA EL SAGHIRA	M	1921	0	6.8	6.0
15	MAGIC DREAM	ALI JAMAAL	THE DREAMSPINNER	M	1992	0.6	6.8	2.3
16	MABROUKA	SID ABOUHOM	MONIET EL NEFOUS	F	1951	0	6.7	3.6
17	BINT SAMIHA	KAZMEEN	SAMIHA*	F	1925	0	6.7	5.1
18	SIDI SCORPIO (AI)	MAGNUM CHALL HVP	SIDI MOONLIGHTING	M	2010	3.3	6.6	2.2
19	MAGNUM PSYCHE	PADRONS PSYCHE	A FANCY MIRACLE	M	1995	0	6.5	3.2

	Ancestor	Sire	Dam	Sex	Birth Year	F	AGR	GC
20	SHEIKH EL ARAB	MANSOUR	BINT SABAH	M	1933	0	6.4	2.1
21	MONIET EL NEFOUS	SHAHLOUL	WANISA	F	1946	0.78	6.4	3.0
22	NASEEM	SKOWRONEK	NASRA	M	1922	0	6.3	3.3
23	ASTRALED	MESAOUD	QUEEN OF SHEBA	M	1899	0	6.3	3.3
24	BEY SHAH	BAY EL BEY	STAR OF OFIR	M	1976	0.94	5.8	3.5
25	NUREDDIN*	RIJM	NARGHILEH	M	1911	1.56	5.8	2.1
26	RASIM	FEYSUL	RISALA	M	1906	0	5.7	2.2
27	KAZMEEN	SOTAMM	KASIMA	M	1916	0	5.6	3.9
28	NASRA	DAOUD	NEFISA	F	1908	0	5.6	2.5
29	SHAHLOUL	IBN RABDAN	BINT RADIA	M	1931	0	5.6	3.6
30	SOTAMM	ASTRALED	SELMA	M	1910	6.25	5.5	2.3
31	BASK	WITRAZ	BALALAJKA	M	1956	0	4.6	3.6
32	GAMIL MANIAL	SAKLAWI II	DALAL	M	1912	0	4.2	3.2
33	AZIZ	HARKAN	AZIZA	M	1881	0	4.1	4.1
34	IBN RABDAN	RABDAN EL AZRAK	BINT GAMILA*	M	1917	0	4.0	3.5
35	RIDAA	MERZUK	ROSE OF SHARON	F	1892	0	3.9	3.0
36	SKOWRONEK		JASKOLKA	M	1909	0	3.9	3.9
37	NAFAA EL SAGHIRA	MEANAGI SEBELI	NAFAA EL KEBIRA	F	1910	0	3.5	3.5
38	BINT RADIA	MABROUK MANIAL	RADIA	F	1920	0	3.5	2.4
39	SID ABOUHOM	EL DERE	LAYLA	M	1936	0	3.5	3.1
40	BAY EL BEY	BAY-ABI	NAGANKA	M	1969	0	3.4	2.6
41	YAMAMA III			F		0	3.4	3.4
42	WITRAZ	OFIR	MAKATA	M	1938	0	3.2	2.3
43	ROSE OF SHARON	HADBAN	RODANIA	F	1885	0	2.9	2.7
44	NEFISA	PROXIMO	DAJANIA	F	1885	0	2.8	2.7
45	SAMIHA*	SAMHAN	BINT HADBA EL SAGHIRA	F	1918	0	2.7	2.5
46	RABDAN EL AZRAK	DAHMAN AL AZRAK	RABDA	M	1897	0	2.7	2.7
47	SAKLAWI II			M		0	2.6	2.6
48	OFIR	KUHAILAN-HAIFI	DZIWA	M	1933	0	2.3	2.2
49	QUEEN OF SHEBA	YARAL	SHEBA	F	1875	0	2.2	2.2
50	FEYSUL	IBN NURA	EL ARGAA	M	1894	0	2.2	2.2

Padron

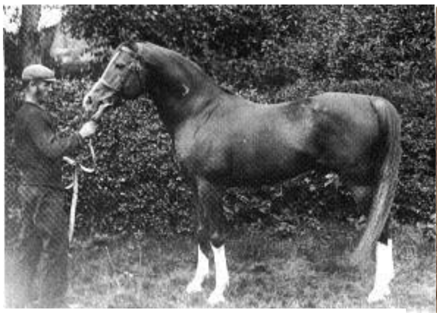
Padron's Psyche



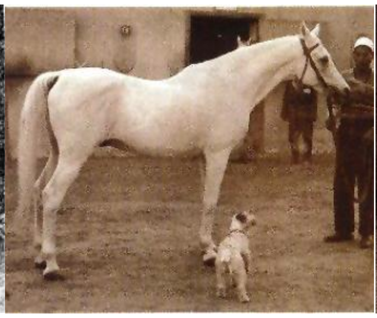
Champion Skowronek as an older stallion.

Showronek

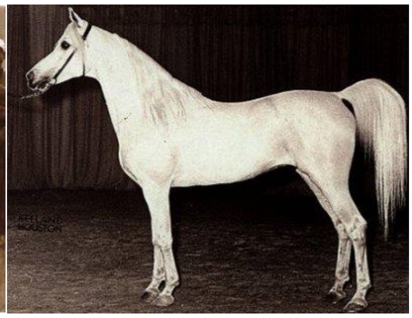
(Photos: Famous Arabian Stallions; Pinterest)



Mesaoud *appears in the pedigree of over 90% of all Arabian horses in the world today* (*wikipedia*)



Nazeer *was born in 1934 in Egypt. He is the sire of Morafic.* Photo:www.arabs-iowa.com



Morafic *was foaled in 1956 in Egypt and later imported to the United States* (*Wikipedia*).

Summary

Table 4: Genetic diversity parameters for the South African Arab Horse breed.

Trait	Arab	OK?	Recommended range	Comments
Numbers registered/year	>1000; declining?		-	Probably declining or not yet registered
Pedigree completeness	100%	✓✓✓✓	>80%	Excellent
Average inbreeding	5-6%	✓✓	<6.25%	Still high; brought down from 9%
Rate of inbreeding	-0.13%	✓✓✓	<0.5-1%	Excellent; Negative
Effective population size: **Short term survival** **Long term survival**	79	 ✓ ?	 >50 >100	Short term survival; but difficult to estimate due to negative rate of inbreeding
Generation interval	9.9 years	✓✓	8-12 years	Average
Age Structure: Sires **(avg age) : Dams**	9.1 years 9.8 years	✓ ✓		
Family size*: Sires **Dams**	7(290)/4 (168) 3 (25) / 2 (15)	✓		
Highest AGR	12.7	✓		Morafic, born in 1956
Highest GC	9.8	✓		Nazeer, born in 1934

*Family size: Average number of foals per parent (max number of foals) / average number of foals selected to become parents (max number of selected foals)

The South African Arab Horse population has exceptionally high levels of pedigree completeness. Levels of inbreeding are acceptable, if taken into account that it has been lowered dramatically from 9% to 6%. Due to the lowered inbreeding, the rate of inbreeding is negative, which is excellent. However, it is difficult to calculate effective population size, as most methods use rate of inbreeding. The South African Arab Horse population seems safe for short term survival. Generation interval, age structures and family sizes are within norms. The ancestors with high AGR and GC scores are important in all Arabian populations worldwide. Breeders should ensure that close relatives are not mated and select (relatively) unrelated bloodlines when importing stallions. It will probably become increasingly more difficult to do so, but will increase genetic diversity to the benefit of the South African population. The Arab Horse is a global breed, and different countries may have emphasized different lines, therefore opening up the possibility of importing relatively unrelated animals.