



**HISPANO-ARAB
BREEDING PROGRAM**

UEGHá -- UNIÓN ESPAÑOLA DE GANADEROS DE PURA RAZA HISPANO-ÁRABE
meaning SPANISH UNION OF HISPANO-ARAB HORSE BREEDERS

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HISPANO-ARAB BREEDING PROGRAM

TABLE OF CONTENTS

GENERAL INFORMATION ABOUT THE BREEDING PROGRAM	6
1. DESCRIPTIVE INTRODUCTION OF THE STARTING POINT.....	7
1.1. Evolution of the Hispano-Arab Breed	9
1.2. Productive Performance of the Breed	11
1.3. Social, Economic and Environmental Implications of the Breed	11
2. STUD BOOK CHARACTERISTICS & ITS MANAGEMENT	12
2.1. Characteristics of the Breed. Hispano-Arab Breed Prototype	12
2.2. Basic Grading as Breeding Stock	14
2.3. Identification and registration of Horses in the Stud Book. Paternity Testing	15
2.4. Stud Book Structure.....	16
2.5. Stud Book Sections & Registration Requirements	16
a) Birth Register	17
b) Permanent Register	18
c) Supplementary Section – Auxiliary Register	19
2.6. Promotion of Horses from the Auxiliary Register to the Main Register	20
2.7. Measures Established to Guarantee Paternity or Parentage Verification.....	20
2.8. Admission of Horses and Reproductive Material for Breeding.....	20
3. BREEDING PROGRAM	21
3.1. Introduction.....	21
3.2. Objectives of the Improvement Program	22
3.3. Detailed Description of Each Phase of the Program and the Timetable.....	23
3.4. Genetic Assessment.....	27
3.4.1. Conformation-Functional Performance tests.....	28
3.4.2. Results Validation Methods.....	31
4. DISSEMINATION OF IMPROVEMENTS AND SUSTAINABLE USE OF THE BREED.....	32
5. BREEDING PROGRAM MANAGEMENT COMMISSION	33



HISPANO-ARAB BREEDING PROGRAM

GENERAL BREEDING PROGRAM INFORMATION

MANAGING BODY OF THE BREED'S ORIGINAL STUD BOOK

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1. NAME OF THE BREED: Hispano-Arab (Há)**2. OBJECTIVE OF THE BREEDING PROGRAM:** Selection and preservation of the breed.**3. GEOGRAPHICAL APPLICATION OF THE BREEDING PROGRAM:**

The Breeding Program shall be applied in all those countries where Hispano-Arab Horses (Há) are found. In 2019, these were:

- Spain
- Other EU Countries: Denmark, United Kingdom

This list could be expanded if breeders of Hispano-Arab Horses (Há) in other countries are incorporated. The Association website shall be updated in a timely manner.

4. PARTICIPANTS IN THE BREEDING PROGRAM:

- List of stud farms collaborating with the Breeding Program. As of the 31st of December of 2019, there were a total of 4,397 stud farms in Spain, of which 1,271 are currently collaborating with the Breeding Program. The list of stud farms and collaborating farms shall be updated annually in Spain's Ministry of Agriculture, Fisheries and Food and its National Information System of Breeds—known as ARCA—and the Association website, together with other information of interest.
 - Other participants: Our own or third parties, as indicated in the table below.
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HISPANO-ARAB BREEDING PROGRAM

Activities	Sub-Contracted Body
Certified Centre for Animal Genetics (Genetic Assessment)	Research Group AGR-218 "Improve and Preserve the Genetic Resources of Domestic Animals" at the University of Cordoba Department of Genetics.
Animal Molecular Genetic Laboratory I (Parentage Analysis)	Central Laboratory in Algete (Madrid)
Gene Bank (Storage of reproductive material)	Gene Bank in Colmenar Viejo (Madrid)
Breeding Centres (Collection, production, storage of reproductive material)	Ministry of Defence Breeding Centre in Ecija (Sevilla) and other authorized centres that may be suitable

All other activities that have not been contemplated in the table above, are not subcontracted, but rather, carried out by the Association.

1. DESCRIPTIVE INTRODUCTION OF THE STARTING POINT

The current Hispano-Arab Breeding Program, in keeping with Regulation 2016/1012, incorporates aspects of the Hispano-Arab Stud Book and the Improvement Program, regulated until now by Royal Decree 2129/2008, approved by Resolution from the General Office for Agricultural Productions and Markets, dated the 18th of July of 2012.

The UEGHÁ (Unión Española De Ganaderos De Pura Raza Hispano-Árabe, meaning Spanish Union of Hispano-Arab Breeders) has been officially recognized and maintains that recognition based on Article 64 of Regulation 2016/1012. Nevertheless, as of the 1st of November of 2018, date when the application of Regulation 2016/1012 enters into force, the UEGHÁ and the Hispano-Arab Horse Breeding Program adjusts to the innovation incorporated into this new legislation.



HISPANO-ARAB BREEDING PROGRAM

The main objective of the Hispano-Arab Horse Breeding Program is to improve (Select) the Hispano-Arab as a breed, in addition to preserving it, as it is a breed that is threatened (classified in the catalogue as being an endangered breed). The applicable geographical coverage includes both Spain, Member States of the European Union and third countries where breeding stock is located and that request registration services, and that are authorized for said services.

The list of stud farms collaborating with the Program (breeders and owners where horses are stabled and that participate in the performance tests) is updated annually in the National System for Breed Information or ARCA*. The Hispano-Arab Horse Stud Book is managed by the UEGHÁ. Horses are registered therein and mention is made of their forebears.

The Hispano-Arab Improvement Program is a series of systematic procedures designed and developed by the UEGHÁ. It focuses on the preservation, improvement and promotion of the Hispano-Arab breed, and is backed by the University of Cordoba AGR-218 Research Group for the "Improvement and Preservation of Genetic Resources of Domestic Animals," as the Official Centre for Animal Genetics that is responsible for the Technical Management of the Improvement Program and the genetic assessment of horses.

All collaborating stud farms have been assigned a code, in addition to the corresponding registration in the General Farm Register. Notwithstanding the above, the UEGHÁ, for the benefit of internal operations, may assign one or several initials. It is not necessary for a given stud farm to have a minimal number of breeding horses. The UEGHÁ shall facilitate the incorporation of new collaborating stud farms into the Breeding Program and to the extent that it is possible, grant priority to support those collaborating stud farms that comply with the orientations that the Breeding Program has established for dissemination.

The UEGHÁ subcontracts certain tasks to a series of bodies, including genetic assessments, as well as other technical activities: Management of the Stud Book database, parentage, etc. Independently of the aforementioned aspects, the UEGHÁ is responsible for complying with the requirements established by the current legislation and that may be established by the authorities at any given time.

* Translator's note: ARCA, as in Noah's Ark, is a complete list of agricultural breeds at Spain's Ministry of Agriculture.



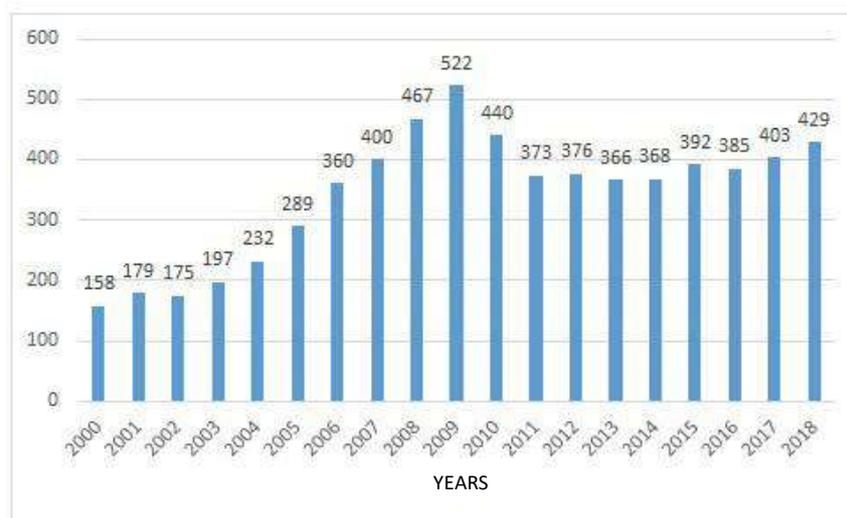
HISPANO-ARAB BREEDING PROGRAM

The qualified centre for genetics, the molecular genetics laboratory and any other body that may carry out subcontracted activities shall be recognized by the authorities, and as may be the case, authorizes other bodies in keeping with national and EU legislation.

1.1. Evolution of the Hispano-Arab Horse

Currently, Hispano-Arab Horses are stable, with a slight increase in terms of the herd census. The current census is around 9,500 live horses.

The number of births is approximately 400 foals/year. The evolution of births has suffered alterations, mainly in times of crisis, which has greatly affected the equine sector.



In 2005, with the creation of the Breed's Auxiliary Register, mares of unknown origin but that had surpassed morphological grading, were registered. This measure translated into the inclusion of a good number of mares as breeding stock. Over the following four years, (2005 to 2008) 1,745 mares were included in the register.

Between 2009 and 2012, there were a considerable number of requests for grading, which led to the registration of 186 mares in the Auxiliary Register. Currently and since 2013, around fifteen mares are incorporated into the Auxiliary Register every year.



HISPANO-ARAB BREEDING PROGRAM

The UEGHá, founded in 2000, is the only officially recognized body to handle the Hispano-Arab Stud Book, both in Spain and internationally.

The Hispano-Arab Stud Book (LG Há) was launched as such in 1986. Since then, and until the 31st of December of 2007, it was managed by Spain's Ministry of Defence Office for Equine Breeding Services (known by most as Cría Caballar), with legislation published by the Ministry of Agriculture, Fisheries and Food to normalise equine breeds. This included Royal Decree 1133/2002, which included the Hispano-Arab Horse as a purebred riding horse, together with specific legislation for this breed by means of a number of laws, such as Order APA/3277/2002. Since that point in time and until today, the Stud Book is managed by the UEGHá and is recognized by Spain's Ministry of Agriculture, Food and the Environment by means of a Resolution by the General Director of Livestock Farming dated the 18th of December of 2007, which involved the issuing of Equine ID Documents and the processing of all types of registration services for Hispano-Arab Horses in the Stud Book and the development of its Improvement Program within the scope of Resolution dated the 18th of June, 2012 by the General Office for Agricultural Productions and Markets, that authorizes the specific legislation for Stud Books and the Hispano-Arab Horse Improvement Program, in keeping with the mandates of Royal Decree 2129/2008, dated the 26th of December.

Therefore, this Hispano-Arab Horse Stud Book was founded in Spain, with there being no other bodies, nor stud books with similar characteristics to those of the Hispano-Arab Horse, in which case, this stud book is considered the original Hispano-Arab stud book. It defines the principles for the breed in Spain and in other countries.

The territory of application for the Breeding Program covers all of Spain as well as the Member States of the European Union and third countries where Hispano-Arab breeding horses are located. Likewise, owners requesting identification and registration services for foals and/or grading of their horses as breeding stock are also covered, in which case, communication and authorization are necessary.

For this, the UEGHá has an advanced, Internet-based IT system that has been specifically designed to handle and cover the aforementioned needs.



HISPANO-ARAB BREEDING PROGRAM

Currently, Hispano-Arab horses are located throughout all of Spain, with Andalusia being home to the largest herd—5,533 horses, which translates into 56.98% of the total. This region is followed by Castile & Leon (10.39%), Madrid (9.1%), Extremadura (4.56%), Catalonia (3.46%), Castile La Mancha (3.03%), and to a lesser degree, Balearic Islands, Galicia, Valencia and the Basque Country.

Equally, the UEGHá is responsible for developing the breed's Improvement Program, with the functional control and supervision of Public Administration.

The city of Sevilla is where the UEGHá is located, and the association enjoys the collaboration of official judges and authorized veterinarians, as well as technical assistance from the University of Cordoba AGR-218 Research Group. It also has an Official Centre for Animal Genetics, which is responsible for the technical management of the Improvement Program and genetic assessment.

The UEGHá's Breeding Program and Internal Rules and Regulations organize the Stud Book structure, elemental management, the controls to which Hispano-Arab horses are subject to, the actual management of the Stud Book and the Improvement Program. It also covers the rights and obligations, both as the association manager, as well as that of breeders, in addition to general functions, which is the responsibility of the UEGHá General Board. ▽

1.2. Productive Performance of the Breed

The Hispano-Arab breed offers a multi-purpose functional aptitude thanks to the balance, resistance and athletic traits of the Purebred Arab Horse and the temperance, hardiness and ability to learn of the Purebred Spanish Horse. This leads to a horse that is versatile, well adapted to work, whether intense efforts or short and precise movements (Doma Vaquera, Dressage, Show Jumping, working in the country side, etc.), as well as those sports that demand resistance (Raid, TREC, etc.).

1.3. Social, Economic and Environmental Implications of the Breed

The breed is a genetic resource of two-fold importance: social-cultural and zootechnical implications.

From the social-cultural point of view, the Hispano-Arab horse is well introduced into the recreational sector of animal husbandry. In recent years, this breed, as with other equine breeds, has lost many of its functions as a work horse to be used more for sports. As a result of the breed's enhanced genetics and the upgrading of its breeding and organizational structures, the breed has enjoyed historic expansion in recent decades together with improved conformation. Its



HISPANO-ARAB BREEDING PROGRAM

basic gaits are obvious thanks to the many awards it has garnered at the many international competitions.

In zootechnical terms, the breed continues to generate wealth in the countryside as a major consumer of raw material, infrastructures and as a workforce, to contribute to fixing rural populations without competing with other consumer species.

Upon considering the historic development of equine species, and more specifically Hispano-Arab Horses in Spain, breeders are extremely confident in the qualities and traits of this breed.

2. CHARACTERISTICS OF THE STUD BOOK AND ITS MANAGEMENT

For the purposes of this Breeding Program, a Hispano-Arab Horse (hereinafter Há) is a horse that is listed in the Birth Register of the breed's Stud Book or LG Há.

2.1. Breed characteristics: Breed Prototype of the Hispano-Arab Horse

The breed prototype of the Hispano-Arab horse is determined by the following characteristics:

a) General Characteristics:

The Hispano-Arab (Há) horse is well-proportioned (eumetric), with a straight (orthoid) profile, a compact (mesomorph) body, slender, harmonious silhouette with light and airy movements. In general, and due to the origins of the breed, the ethnic characteristics could vary, without these motivating disqualification or objection. The conformation is characterized by its overall harmony and clear orientation for sport, with a gracefully slender and distinct silhouette.

b) Conformation Traits

Horses present a medium sized pyramidal head, straights or slightly convex and wide forehead, mobile and medium sized ears, discretely separated with tips tending to turn inwards. Eyes are rounded, full-faced and expressive, with well-



HISPANO-ARAB BREEDING PROGRAM

defined orbital arches. Straight or discretely sub-concave face, rounded jaw with ample spacing between them, rounded forward projecting nostrils and thin lips. A slightly elongated neck that is gently arched at the top edge, well connected to the head and body, with a high insertion just above the scapular-humeral union. Strong deep trunk connected to the rest of the body, with prominent withers in extension towards the back. Slightly curved back, wide, muscular and horizontal loin well connected in the front and back. Long, strong and slightly inclined (with an angle close to 25 degrees) croup. Deep breast, elliptical thorax with gently arched ribs. Collected flanks and belly. Limb length proportionate to the body and appropriately aligned. Front-legs: Long and oblique shoulder-blades, offering a long and strong forearm; short cannon bones and pasterns with lean, defined and proportionate tendons; broad and well-defined fetlocks; ample hooves, with medium heels towards the pasterns at an approximate angle of 45 degrees. Hind-Legs: Well developed thigh muscles, wide buttocks and long gaskins. Body parts below these have similar characteristics to those of the front-legs.

c) Functional characteristics

The combination of physiological adaptations from both parental breeds have given the Hispano-Arab horse a wide range of movements, characterized by three ground covering, regular, cadenced, and balanced paces, which result in agile and distinct movements.

d) Phaneroptic characteristics:

Fine short coat. Greys, chestnuts and bays are the dominant coat colours, with other colours being accepted except pinto.

e) Behavioural characteristics:

These horses are extraordinarily docile, easy to handle and quickly build bonds with their riders and grooms. They have an active temperament and quick responses, sober and tough, able to overcome adversities without excessive efforts. They are easy learners.

f) Aptitudes

This breed is excellent riding horse; it is very versatile and able to satisfy all sorts of riders in any discipline or recreational activity.



HISPANO-ARAB BREEDING PROGRAM

The special predisposition for sports highlights the abilities of the Hispano-Arab horse in categories such as Doma Vaquera, Acoso y Derribo, Working Equitation, Raid, TREC, Dressage and Carriage Driving. Likewise, the breed offers the appropriate personality for endurance competitions and group sports.

g) Disqualifying defects:

In general, disqualifying defects are those specific to the breed, in keeping with the current Breed Quality and general for the species, whether conformation, physiologic or behavioural traits. More specifically, disqualifying defects include fallen crest and non-accidental cryptorchidism and monorchidism.

2.2. Grading as Breeding Stock

Authorized Personnel:

Judges shall assess conformation and functional aptitudes as well as the character/temperament that stallions and mares included in the Birth Register to achieve the category of “Approved Breeding Stock” and be registered in the Permanent Register. Judges shall be technical specialists of the breed in charge of evaluating the breed quality of horses depending on the established prototype in the current Breeding Program and internal rules and regulations governing the UEGHÁ Board.

Moreover, Judges shall be in charge of collecting data for the Improvement Program, zoometric measurements and the detection of disqualifying defects. Judges shall be authorized by the body managing Hispano-Arab Stud Book to carry such tasks as registrations in the Permanent Register and appear on the list that is published and updated at the beginning of each year. Also, the UEGHÁ is responsible for the proper training and accreditation of its staff, as well as monitoring their actions.

Procedures:

Grading for Basic Aptitudes for Breeding shall be requested by the owner of the horse once it is three (3) years of age and, said grading shall be carried out using a scoring system with possible elimination, based on disqualifying defects, or the tally of penalizing defects for the breed as for the species, as defined in the corresponding breed prototype. Penalizing defects include disproportionate



HISPANO-ARAB BREEDING PROGRAM

conformation or conformation that is contrary to the breed prototype such as sub-convex contour, malformation of the neck, inverted or lowered, incorrect insertion, presence of an extremely high neck insertion (also known as golpe de hacha), overly vertical shoulder, lack of withers or excessively prominent, sunken back, poor limb alignment, broken croup, among others.

When grading, the designated judge shall fill out the specifically designed score sheets with information regarding zoometric measurements, including height at withers, height of the breast, sub-sternum space, scapular-humerus length width of chest, as well as the perimeter of knee and cannon bones. Scoring is based on a scale from 1 to 10 points for each of the body parts and paces, with specific weight designated by the following coefficients: head (0.5), neck (0.5), fore limbs (1), trunk (0.5), hind limbs (1), limb alignment (1.5), general harmony (1), and paces: walk (1.5), trot (1.5) and canter (1). Horses that are approved for their Basic Aptitudes for Breeding with a minimum of 60 points and no partial score lower than 5 will be granted the category of “Approved Breeding Stock”. Horses that fail to pass this cut-off point will remain registered in the Birth Register. The category obtained (Approved or Not Approved) must appear on the horse’s Equine ID Document (EID) and in the Stud Book database. Horses that fail the Basic Aptitude for Breeding will have a second chance to repeat the assessment a year later.

2.3. ID and Registration of Horses in the Stud Book

Parentage Testing

All horses registered in the Hispano-Arab Stud Book shall be identified individually in keeping with the current regulations for the identification of equines. Horses will be assigned an individual identification code that will be used when registering that horse in the Stud Book and shall appear on all zootechnical documentation concerning said horse. Registration in the Birth Register may be based on the horse’s forebears, when the parents are included in the Permanent Register of the Hispano-Arab Stud Book, or in the corresponding Stud Books of other accepted breeds. Thus, to guarantee the genealogy of horses registered in the Stud Book, a mandatory parentage test shall be performed on all horses prior to their definitive registration, by means of molecular analysis at authorized Animal Genetic Molecular Laboratories.



HISPANO-ARAB BREEDING PROGRAM

At the breeder's request, usually at weaning, without the foal necessarily being with its dam and within the established time line for the identification of foals (before the twelfth month from the day the foal is born), the identification for the registration shall be carried out.

The breeder shall present an Identification Request for Service for the registration through the established request for service form, indicating the name, REGA (livestock farm registration) code, date of birth and proposed parents, accompanied by the covering and birth certificate and the receipt confirming the payment of the established fee. Likewise, the breeder may propose the authorized veterinarian to carry out the identification from among the names that appear on the list of authorized personnel ranked by provinces.

Once the request is reviewed and, if properly completed and filled out, the service is charged, a message is sent to the veterinarian who may reject or accept the service and later download the documentation needed for the preregistration. Upon contacting the breeder, the veterinarian will schedule a visit to the stud farm and perform the action according to the established procedures.

2.4. Stud Book Structure

Main Section

- Birth Register: Section A and B
- Permanent Register: Section A and B

Appendix

2.5. Stud Book Division and Registration Requirements

The Hispano-Arab Stud Book is made up of a Main Section that includes both the Birth and Permanent Registers. Then there is an Appendix that includes the Auxiliary Register.



HISPANO-ARAB BREEDING PROGRAM

a) Birth Register

Authorized coverings: Parents allowed for coverings are horses registered in the Permanent Register of Hispano-Arab Stud Book, Purebred Spanish Horses (PRE) approved for breeding stock and Purebred Arabian Horses (PRa') with prior authorization by the Governing Board of the UEGHÁ.

Authorized coverings include: one Hispano-Arab (Há) parent mated with another of the same breed or with a PRE or Purebred Arabian Horse (PRá). Should one of the parents be included in the Hispano-Arab Auxiliary Register, the other parent must be listed in the Permanent Register of the Hispano-Arab Stud Book. Coverings between PREs and PRa's breeding stock are also allowed.

Cross-breeding	Há	PRE	PRá	Auxiliary Register
Há	Há (A,B)*	Há (B)	Há (B)	Há (B)
PRE	Há (B)	----	Há (B)	----
PRá	Há (B)	Há B)	----	----
Auxiliary Register	Há (B)	----	----	----

(*) According to conditions described in this current Breeding Program.

Division of the Birth Register:

All Hispano-Arab Horses are registered in the Birth Register, which is divided into two sections, depending on the type of covering and the resulting mathematical average of the parents' Arab blood. Thus, the following is described:

* Section A: Horses meeting the following requirements are included in this section:

- Having a percentage of between 25% and 75% of Arab blood, both inclusive,



HISPANO-ARAB BREEDING PROGRAM

- Both parents are included in the Permanent Register of the Hispano-Arab Stud Book,
- Having grandparents listed in the Permanent Register of any other authorized breed Stud Book.

* Section B: Horses that fail to meet any one of the requirements to be included in Section A. Also, horses resulting from a covering of Breeding Stock included in the Permanent Register of the Hispano-Arab Stud Book and Breeding Stock from the Auxiliary Register of the Há Stud Book, with the parent of said horse being listed in the Permanent Register with 50% Arab blood.

For both Sections, the percentage of Arab blood shall appear after the name of the horse; this is calculated as the mathematical average of its forebear's percentage.

b) Permanent Register

As in the Birth Register, this Register is also divided into two sections:

Section A: For breeding stock coming from Section A of the Birth Register that have reached 3 years of age, are true to the breed prototype described in this current Breeding Program, and, surpass the required grading as breeding stock, in accordance with this current Breeding Program, to earn the category as "Approved Breeding Stock."

Section B: For breeding stock coming from Section B of the Birth Register that have reached 3 years of age, are true to the breed prototype described in the current Breeding Program and, surpass the required grading as breeding stock, in keeping with the current mandates, to obtain the category of "Approved Breeding Stock."

In the case of both sections, horses that do not pass this grading shall remain in the corresponding section of the Birth Register. Exceptionally, horses—which at a given moment were considered "Not Approved" but, due to their achievements in sports have obtained outstanding functional results in an official category—may be included as Breeding Stock after prior review for approval by the governing body of the UEGHÁ.



HISPANO-ARAB BREEDING PROGRAM

Within this Register and for both sections of the Permanent Register the following categories are applicable for Register of Breeding Stock:

Register of Young Recommended Breeding Stock: Mares and stallions included in the Permanent Register, between the ages of 4 and 6, that by assessing the Performance Test results established in the Improvement Program, along with genealogical data, obtain a Combined Genetic Index (CGI) above the established threshold of 70 percentile (70%) and a reliability greater than 0.5 (RAP 2).

$$\text{CGI} = \text{GvHarmony} * 1 + \text{GvWalk} * 1.5 + \text{GvTrot} * 1 + \text{GvCanter} * 1.5$$

See Translator's Note below

Register of Improver Breeding Stock: mares and stallions that are 7-years-old and older, included in the Permanent Register, with at least one tested descendant, that by means of assessing Performance Test results established in the Improvement Program, along with genealogical data, obtain a Combined Genetic Index (CGI) above the 70 percentile threshold and a reliability greater than 0.7 (RAP 2).

Register of Elite Breeding Stock: Horses that are 7 years of age and older, are listed in the Permanent Register, have obtained the Category of Improver Breeding Stock for any of the criteria established in the Improvement Program and in addition to that, the horse and/or its descendants have excelled in sports and/or at official UEGHá tests.

Upon attaining any one of the aforementioned categories, all information regarding the achievements of said horse shall be included in the Hispano-Arab Stud Book, and shall appear in that horse's Equine Identification Document (EID).

C) Appendix - Auxiliary Register:

This section is for mares with unknown genealogy but that prove conformation and functional qualities by passing the grading described in the current Rules and Regulations.

In the cases of stallions, in addition to the above, these shall prove their worth by means of achievements in sports, extraordinary functionality results in an official discipline, prior review for approval by the Governing Body.

* Translator's Note: Gv = Genetic Value



HISPANO-ARAB BREEDING PROGRAM

2.6. Promoting Horses from the Auxiliary Register to the Main Register

Progeny of horses included in this register may access Section B of the Hispano-Arab Birth Register as long as they are by or out of Breeding Stock included in the Permanent Register of the Hispano-Arab Breed. All these descendants shall be registered with a percentage of Arab blood that is equivalent to half of the percentage of the Hispano-Arab parent. The system is identical to that of the Main Register.

2.7. Measures Established to Guarantee Parentage or Paternity Testing

To guarantee the reliability of genealogies, parentage tests are performed (by means of genetic markers) to all horses without exceptions. The Laboratory must approve the compatibility of both parents for a horse to be registered.

In the event of incompatibility of a proposed parent, another parent may be proposed. A new parentage test will be performed and/or blood extracted once again, as may be deemed necessary.

2.8. Acceptance of Horses and Reproductive Material for Breeding

The UEGHÁ shall accept breeding horses and reproductive material for breeding in keeping with the requirements established in Article 21 of the Regulation 2016/2012.

For now, there are no minimum enforceable requirements for Performance Tests (PT) or Genetic Assessments (GA) for breeding stock from which reproductive material is obtained for Artificial Insemination (AI), the extraction of oocytes and/or embryo transfer. Nor are there limitations to the use of one or more reproductive method or the use of horses for one or more reproductive method, including the use of its reproductive material.

It is not foreseen to limit nor ban the use of a breeding horse and its reproductive material, since it does not endanger the preservation or diversity of the breed. The only exception is in the case of horses that have not passed the grading –as Breeding Stock, in which case, said horses must not be used.



HISPANO-ARAB BREEDING PROGRAM

Authorized artificial reproduction methods include insemination and embryo transplant for all horses listed in the Permanent Register of the Hispano-Arab Stud Book.

These methods shall meet the criteria established by the Stud Book's Managing Body and always within the framework of the zootechnical-hygienic legislation in force at any given time. The guidelines established in the Improvement Program must be taken into account at all times to guarantee the genetic variability of the herd.

3. BREEDING PROGRAM

3.1. Introduction

Based on the herd census, breed characteristics and cataloguing, a Selection-Preservation Program is used to select the best Breeding Stock to ultimately transmit specifically defined and desirable traits to descendants. Additionally, the ultimate goal is to maintain genetic diversity to guarantee the preservation of the Hispano-Arab breed.

The Performance tests that Hispano-Arab Horses are subject to are a set of actions aimed at systematically verifying productions and functional aptitudes of these horses. At the same time, other valid information is collected to determine the genetic value of the breeding horses in accordance with the model and the Breeding Program.

Performance tests are carried out at the following events:

- a) Young Horse Selection Tests (PSCJ).
 - b) Assessment/Grading of Individual Breeding Stock.
 - d) Field Tests.
 - e) Breeding and Selection Competitions specific to the Breed.
 - f) Competitions for the various equestrian disciplines.
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HISPANO-ARAB BREEDING PROGRAM

Through the assessments and grading performed at the Hispano-Arab Breeding and Selection Competitions, Aptitudes for Breeding and Field Performance tests, a numeric value is assigned to each horse. With this, the score granted by Official Judges who are duly accredited as specialists in Conformation for each body part, paces, Breed Prototype and harmony is tallied.

Genetic Assessment corresponds to a set of actions performed on the herd at Performance tests and genealogy registers. This data allows individual genetic values to be obtained for the traits established in the Breeding Program including precision or reliability of those traits. Genetic Assessment of Breeding Stock allows horses to be categorised based on their genetic merits with the objective of selecting the best horses as the parents for future generations.

Breeding Stock Assessments are performed individually as well as on ancestors, descendants and collaterally. An ancestor takes into consideration a greater or lesser number of horses from preceding generations. Individual horses are tested, in which case, its traits are verified and Performance tests carried out. Descendants and collaterals are considered the progeny and blood relatives (including aunts, uncles, cousins, etc.), distributed among the various stud farms.

Genetic Assessments are based on genealogic and phenotypical information. The results are expressed in terms of genetic values in genealogic documentation and in the Breeding Stock Catalogue for each selection objective. Data on reliability and date of assessment are included in the results when published.

3.2. Improvement Program Objectives

Improvement of Conformation and Basic Paces

The aim is to have horses with specific conformation traits (conformation-functional) and movements (walk, trot and canter) that indirectly favour functional performance within the established breed quality.

- Criterion 1: Body harmony score.
 - Criterion 2: Moving at walk score.
 - Criterion 3: Moving at trot score.
 - Criterion 4: Moving at canter score.
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HISPANO-ARAB BREEDING PROGRAM

3.3. Detailed Description of each Phase and Timeline

Being that the Breeding Program is an on-going project the following implementation phases and yearly timeline have been established and are explained herein. The Selection Scheme defines the strategies for the use of genetically assessed Breeding Stock in keeping with their functional versatility while striving towards maximizing the dissemination of the genetic progress without forsaking genetic variability.

The Hispano-Arab Improvement Program shall only consider horses registered in its Stud Book and that meet the requirements regarding participation in Performance Tests, as defined herein. All horses participating in the Tests shall be part of the Improvement Program. The Hispano-Arab Horse Improvement Program is structured in 5 phases described as follows:

- | | |
|--------------|--|
| Phase One: | Genetic assessment: Birth Register. |
| Phase Two: | Genetic assessment: Permanent Register |
| Phase Three: | Performance Tests and Individual Genetic Assessments:
Young Recommended Breeding Stock. |
| Phase Four: | Genetic Assessment of Descendants:
Improver and Elite Breeding Stock |
| Phase Five: | Catalogue of Breeding Stock |

PHASE ONE:

GENETIC ASSESSMENT: BIRTH REGISTER

Phase One of the Improvement Program includes the identification and description of all foals born each year and that are listed in the Main Section of the Hispano-Arab Stud Book Birth Register, in accordance with the Hispano-Arab Breeding Program.



HISPANO-ARAB BREEDING PROGRAM

To guarantee reliability of genealogical data upon which the Genetic Assessments described in this Improvement Program are based, a mandatory parentage test is performed using molecular DNA testing.

Once foals are registered, they shall be subject to Performance Tests and monitoring throughout the first three (3) years of life, with their conformation, functionality and basic movements being carefully observed when participating in Breeding and Selection Competitions specific to the Breed.

PHASE TWO:**GENETIC ASSESSMENT: PERMANENT REGISTER**

To be considered Breeding Stock in the Permanent Register, within the Main Section of the Hispano-Arab Stud Book, once a horse is listed in the Birth Register, and is three years of age, it must surpass the grading as Basic Aptitude for Breeding. Its conformation score must be in keeping with the breed standards, in which case, it will be included in the Permanent Register as “Approved Breeding Stock.”

With regards to the preservation of the breed, all measures deemed necessary to guarantee the genetic variability of the herd and verification of inbreeding levels, may be adopted to avoid the loss of horses by storing reproductive material and productive breed traits. Within the context of “in situ” preservation actions, optimising the selection of breeding stock for reproductive purposes shall be carried out the following criteria, in an effort to facilitate its understanding on behalf of technical specialists and breeders.

Inbreeding Coefficient

Elevated inbreeding levels in a horse determine a tendency towards homozygosity and, therefore, its consequences. These consequences include, but are not limited to a decrease in productive and reproductive efficiency, low stress resistance or the emergence of deleterious gene expressions like various genetic deficiencies. All cause low biological efficiency in horses.



HISPANO-ARAB BREEDING PROGRAM

At a herd level, average consanguinity gives an indication of the overall herd genetic status. A high inbreeding rate in a herd could lead to a decrease of genetic diversity; in other words, low functional and reproductive capability. In general, herd consanguinity levels above 12-14% could pose a threat to the breed. Therefore, periodic verifications of herd consanguinity progress are carried out as major indicator of breed behaviour and the effectiveness of breed preservation.

Genetic Preservation Coefficient

Considering how the breed is created, with the incorporation of Purebred Spanish Horses (PRE), Arabian Horses (PRá) and Hispano-Arab Horses (Há), both in the Main and Auxiliary Registers, horses listed in the Main Register are considered the foundation stock. It is interesting to see the influence of the foundation stock on the pedigree of their descendants. Consequently, it becomes a source of information regarding the authenticity or purity maintained as the herd evolves.

The Genetic Conservation Coefficient is based on the number of Hispano-Arab (foundation stock) in an individual pedigree, and the generational consistency (more or less recent) with regards to an individual. Therefore, those horses with more Hispano-Arab (foundation) blood in their pedigree and with a more recent positioning in the genealogic chart are of greater interest in terms of preservation.

Horses that are reproductively active are classified by their combined index, which takes into consideration, both proportionally and simultaneously, the classification of those horses in the general herd population, based on their individual Inbreeding and Genetic Preservation Coefficients. In terms of the preservation of genetic material in the Gene Bank and the selection of the most appropriate sire stallions based on their position in the ranking of live stallions for the combined index shall be taken into account.



HISPANO-ARAB BREEDING PROGRAM

Preference shall be given to those horses that, although they have the same combined index, are registered in Section A, are older and belong to different stud farms. In other words, those horses that are of greater interest for the possible recuperation of the breed.

PHASE THREE:**PERFORMANCE CONTROLS AND INDIVIDUAL GENETIC ASSESSMENT: YOUNG RECOMMENDED BREEDING STOCK**

During Phase Three of the Improvement Program, conformation-functional and basic movement performance test will be undertaken. Data will be collected at the actual stud farms (Field Performance Tests), as Hispano-Arab Breeding and Selection Competitions, as well as at Young Horse Selection Tests for Doma Vaquera.

Traits that will be assessed genetically include: Harmony, walk, trot and canter.

PHASE FOUR:**PROGENY-BASED GENETIC ASSESSMENT OF IMPROVER AND ELITE BREEDING STOCK**

Once the statistical-genetic result information is processed, a genetic assessment will be performed using the BLUP Animal Method for all horses, together with any and all results available for their relatives. The results will then be sent by the AGR-218 Research Group to the Breeder Association, which in turn, will be responsible for sharing said information with all breeders involved in the Improvement Program. The objective is to reinforce the procreation of these horses to attain improved genetic progression of the breed. Likewise, this information shall be stated in the Breeding Stock reports for immediate use by breeders to aid them in quickly increasing the number of offspring

Throughout this phase, the genetic reports obtained from the genetic assessment with the BLUP Animal Model for each horse will be used to determine those horses that will make up the first quartile for the distribution of breeding values for



HISPANO-ARAB BREEDING PROGRAM

each of the criterion taken into consideration, with a minimal precision, understood as the correlation between the real additive genetic value and the predicted of 0.9 for stallions and 0.8 for mares, its quadratic equivalence considered as reliability.

PHASE FIVE:

BREEDING STOCK CATALOGUE

Once the genetic assessment has concluded, the UEGHá shall publish the Breeding Stock Catalogue. This Catalogue shall include all those horses—both stallions and mares—that have attained one of the categories as Young Recommended Breeding Stock, Improver Breeding Stock or Elite Breeding Stock. The criteria stated in the aforementioned phases shall be followed.

The objective of the Catalogue of Breeding Stock is to share and promote each of the genetic categories described in the Improvement Program. Moreover, the group of horses that have attained the category as “Young Recommended Breeding Stock” will also be included to promote their use in breeding for greater and faster genetic progress by contributing to reducing the generational interval of the breed. Also, as breeders quickly incorporate these breeding horses, “Young Recommended Breeding Stock” will help increase the number of progeny, thus contributing to attaining further categories such as “Improver Breeding Stock” and/or “Elite Breeding Stock,” once their offspring have taken the Performance Tests included in this Improvement Program.

3.4. Genetic Assessment

The joint use of information derived from the Performance Tests and the genealogical registrations allows genetic assessments to be performed.

It is paramount to systematically collect the information generated at the Tests, as well as conformation-functional grading and the assessment of basic movements. Also, the results of the Young Horse Selection Tests (PSCJ) and other sports events where Hispano-Arab Horses participate shall be stored.



HISPANO-ARAB BREEDING PROGRAM

Currently and due to its limited quantity for the entire population with regards to the kinship matrix, this latter information is not used, as it would interrupt the orthogonality of the design and lead to erroneous results and low precision.

3.4.1. Conformation-Functional Performance Tests

The conformation-functional assessment of horses and their basic movements shall be performed at the Grading Tests for Breeding Stock (Basic Aptitude) and at Breeding and Selection Competitions. These latter shall be known as Conformation-functional Performance Tests for Hispano-Arab horses. There shall also be Field Performance Tests. This information shall be collected at the Young Horse Selection Tests for Doma Vaquera.

At the onset of the year, the Test Calendar for Conformation-Functional Performance Tests for Hispano-Arab horses shall be announced, as well as the Young Horse Selection Tests for Doma Vaquera. The venue location and dates shall also be announced. All efforts will be made for these events to coincide with: Meetings for the Grading and Selection of Breeding Stock and the Young Horse Selection Tests for Doma Vaquera to optimize resources and maximise the number of horses taking the performance tests.

At the tests, participation is open to all horses (stallions and mares) registered in the Hispano-Arab Stud Book, ranging between one (1) year of age and older, and may participate in the Breeding and Selection Competitions. For horses that are three (3) years of age and older, these may participate in the Grading as Breeding Stock (Basic Aptitude). In the case of horses that are between four (4) and six (6) years of age, they may participate in the Young Horse Selection Tests for Doma Vaquera.

At these Performance Tests, data is collected regarding the following aspects:



HISPANO-ARAB BREEDING PROGRAM

- Identification of the Horse:

The necessary information shall be collected to identify the horse that appears on the Equine Identification Document.

Likewise, this identification shall be complemented with the information available in the Stud Book, and any other relevant information to guarantee perfect correlation among all databases used at the various performance tests carried out within this current Improvement Program.

- Conformation Grading of Body Harmony:

This methodology shall be used in the genetic assessment of horses' conformation-functionality.

- Assessment of the Three Basic Movements: Walk, Trot and Canter:

All tests shall be performed with horses held by the groom/handler. In the future, the presentation may be under saddle in the case of horses that are three (3) years of age and older, when grading their Basic Aptitude as Breeding Stock and for four (4) year olds and older at Conformation Competitions. These tests shall be carried out by means of assessments or a grading issued by qualified judges, who have been duly trained to have standard grading criteria.

- Detecting Defects. Any and all defects seen in the participating horses, whether conformation, physiological or locomotive, shall be indicated during the performance tests for use to preclude mass selection.

- General Data of a Horse:

- Identification.
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HISPANO-ARAB BREEDING PROGRAM

- External Factors: stress prior to the event, level of training, rider information (name, weight and level in sports)
- Classification attained at the test, expressed in ranking.
- Final score, expressed in points.
- Partial score earned, expressed in points
- Other noteworthy data.

- General Test Information:

- Venue Location and Date of the event.
- Category.
- Total number of participants.
- Environmental information: season of the year, temperature, humidity, type and state of the ground cover, etc.
- Judges.

Data collection at tests shall be undertaken by means of an especially designed score sheet for Performance Tests that included harmony and paces. Said score sheet shall guarantee the correct collection of all essential data for the genetic assessment at a later date.

For the genetic assessment, it is essential that all traits, collected at the various Performance Tests be adjusted to the normal distribution; in which case, it may be essential to perform a series of prior mathematical transformations (logarithm, square root, ponderation, etc.). These could change based on the variable being used at a given point.

The score/data collection sheets are found in the Hispano-Arab Competition Rules and Regulations for Breed and Selection and the Young Horse selection Tests, all of which are available on the website



3.4.2. Method Used to Validate Results

All results shall be subject to Normality Tests and Fixed-Effects Models to determine possible abnormalities and/or incoherent data.

Requirements and Methods for Genetic Assessment

Genetic assessment is performed using BLUP (Best Linear Unbiased Predictors) methodology. It is applied to repeated-measure animal models, using the MTDFREML package (Boldman & cols., 1995).

The effects included in this analytical model are:

- Fixed Effects:
 - Group size; (26 levels). Classification of stud farms into manageable groups, based on their herd census, due to the fact that there are a large number of stud farms with a single horse.
 - Year (date);
 - Season; (4 levels: Spring, summer, autumn and winter).
 - Sex; (2 levels: Stallion and Mare).
 - Type of test; (3 levels: grading, competitions and Young Horse Selection Tests).
- Linear and Quadratic Co-variable:
 - Age.
- Random Effects:
 - Additive genetic value of the horse.
 - Permanent environmental effect of the horse.
 - Random effect of judge (68 levels).
- The response variables were: Harmony, walk, trot and canter.

Statistical Methods



HISPANO-ARAB BREEDING PROGRAM

The Animal Model is normally used in the infinitesimal context, based on mathematical methodology of restricted maximum likelihood (REML), using a derivative-free algorithm in estimation of genetic parameters, but with its own parameters as initial convergence criteria. To attain the breeding values, linear mixed models are used, with different structures for fixed and random effects, depending on the selection criterion used.

The precision of the genetic parameters are considered by the value of their estimation errors and that of the additive values based on the correlation between the predicted additive genetic value and the real value, or by their quadratic value understood as their reliability.

4. DISSEMINATION OF IMPROVEMENTS AND SUSTAINABLE USE OF THE BREED

The dissemination of Improvements is seen from two complementary points of view. First of all, the sharing of knowledge regarding genetic values of the horses graded. This is followed by the actual dissemination of genetic material.

Sharing the results shall be announced in two different ways. First of all, the general solutions of each genetic assessment shall be announced on the Association's web site, but there will also be timely publications of the Breeding Stock Catalogue. This catalogue includes improver mares and stallions that show the highest precision in terms of genetic values.

First of all, annual internal genetic reports will be drafted for the members of the selective nucleus. Secondly, a Catalogue of Elite Improver Breeding Stock will be drafted. It will include the best horses—both stallions and mares—based on their combined additive index, obtained by pondering the criteria for their economic values. This catalogue will be uploaded at www.caballohispanoarabe.com in both Spanish and English.



HISPANO-ARAB BREEDING PROGRAM

Upon applying the aforementioned points, the excellence of these horses are made know. This facilitates decision making when acquiring improver reproductive material, as it is based on phenotypical reports. Thus, breeders are in a position to use those genotypes that truly complement the genetic profiles of their horses, to then disseminate their own genetic material and genetic progress.

With reference to the sustainable use of the Hispano-Arab breed, the repercussions of the breed when generating wealth in rural areas must be highlighted. These include recreational activities that do not compete with other productive sectors. Moreover, the extraordinary perspectives for expansion of equines—more specifically Hispano-Arab horses in Spain—offer sustainability in the short and medium term. This is all possible with the support of the Improvement Program, the importance of which has already been confirmed.

5. BREEDING PROGRAM MANAGEMENT COMMISSION

The Management Commission shall be made up of representatives from Public Administration and Breeders:

- The President of the UEGHÁ or Unión Española de Ganaderos de Pura Raza Hispano-árabe, who shall preside over the Commission.
 - The Technical Inspector for the breed.
 - The UEGHÁ's Technical Director/Hispano-Arab Stud Book Director.
 - Association technicians.
 - The geneticist from the Certified Centre for Animal Genetics.
 - A representative from breeding centres.
 - Others: in such case that these be deemed necessary, breeders and judges may be invited to sit on the Commission.
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