

## Rabbit genetic resources of Egypt

M.H. Khalil<sup>1, 2</sup>

<sup>1</sup>Department of Animal Production & Breeding, Faculty of Agriculture and Veterinary Medicine, King Saud University, **Buriedah**, Qassim, P.O. Box 1482, Kingdom of Saudi Arabia

<sup>2</sup> On Secondment from Department of Animal Production, Faculty of Agriculture at Moshtohor, Zagazig University, **Moshtohor**, Qalyoubia, Egypt

### Summary

In Egypt, there are three breeds of rabbits, Giza White, Baladi and Gabali. For Baladi rabbits, there are three strains; Baladi Red, Baladi White and Baladi Black, while Sinai Gabali and Desert Gabali are considered the two strains of Gabali rabbits. Giza White rabbits are usually called improved Giza or El-Giza El-Mohassan. These Egyptian rabbits are medium-sized breeds and used mainly for meat production. Giza White and Baladi rabbits are docile, while Gabali rabbits are moderately tractable. Origin, physical description, and census data for these Egyptian genetic resources were described. Also, they were characterized with regard to their performance (e.g. reproductive efficiency, lactational and maternal abilities, growth rate, feed conversion ratio, carcass traits and meat composition, hair and fur quality, etc.) and adaptability to heat stress.

### Resumen

En Egipto existen tres razas de conejos, Giza White, Baladi y Gabali. Dentro de la raza Baladi tenemos tres grupos: Baladi Red, Baladi White y Baladi Black; mientras que la Sinai Gabali y la Desert Gabali vienen consideradas como dos grupos de la raza Gabali. La raza Giza White viene llamada normalmente Giza mejorada o El-Giza El-Mohassan. Estos conejos son de un tamaño medio y vienen utilizados principalmente para carne. Las razas Giza White y Baladi son dóciles, mientras que la raza Gabali lo es

mucho menos. Se presenta el origen, la descripción física y el censo de este recurso genético animal en Egipto. También se presentan sus características de rendimiento (eficacia de reproducción, capacidad de lactación y materna, índice de crecimiento, índice de conversión, elementos de la canal y composición de la carne, calidad del pelo y de la piel, etc.), así como la resistencia al estrés producido por el calor.

**Key Words:** Rabbits, Genetic resources, Characterization, Production performance, Egypt.

### Introduction

The annual consumption of rabbit meat per head of the Egyptian population is low (about 0.7 kg) in comparison with other types of meat and with other Mediterranean countries. The annual per capita consumption of rabbit meat is 3.6, 3.5, 3.5 kg in France, Italy and Spain, respectively. These figures indicate that there is a potential for developing a home market in Egypt.

Most of the Egyptian rabbit genetic resources are endangered since the total number of breeding rabbits is less than 1 500, most of them scattered in state farms. Several attempts have been carried out to edit the information available on rabbit genetic resources, especially in the Mediterranean and European countries. Among these attempts, is the data bank entry developed by the European Rabbit Project funded by the EC in France at the National Institute for Agricultural Research (INRA) in cooperation

with the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM). The Descriptive Model proposed by Khalil (1993) and the one suggested by Bolet *et al* (1996) were the main forms to introduce data collected into the Data Bank Entry Project. Also, a booklet was published by CIHEAM introducing a descriptive model for rabbit genetic resources in Mediterranean countries with an application to the Egyptian breeds (Khalil, 1997). This booklet was distributed among members of the Mediterranean Rabbit Group (organized by CIHEAM) in order to compile all the information obtained in a book on rabbit genetic resources in Mediterranean countries. Egyptian genetic resources are included in these attempts. Therefore, the objective of this article is to present the information available on the Egyptian breeds of rabbits to be compiled.

## Origin of Giza White

In 1932, a native stock of rabbits (Baladi rabbits) was bred by the Animal Breeding Department, Cairo University, Giza, Egypt, in an attempt to form a breed of uniform

characteristics (El-Khishin *et al*, 1951). These rabbits were of different colours and sizes. Colours were isolated and black and albino colours were segregated. In 1937, systematic breeding took place with the objective of obtaining an albino type of rabbit with faster rate of growth and a larger litter size which is presently known as the Giza White breed. Closed breeding in the albino population was performed for several years.

## Origin of Baladi

Crossbreeding for several generations was practised between local (native=*'baladi'* in Arabic) rabbits and the Flemish Giant (G) in stations of the Poultry Breeding Section, Ministry of Agriculture (Badawy, 1975; Galal and Khalil, 1994). The breeding plan used for producing the three native strains of Baladi Red (R), Baladi White (W) and Baladi Black (B) is reported in table 1.

Heavier does of the Giant Baladi genotype were upgraded by mating them to pure Giant Flander bucks for several generations and selection for pure colours of red, white and black was practised for producing strains of Red Baladi, White Baladi and Black Baladi.

*Table 1. The breeding plan used for producing the three native strains of Baladi Red (R), Baladi White (W) and Baladi Black (B)*

Baladi x Baladi			
Selecting does with heavy weight and of particular colour			
	Red-coloured Baladi (R)	White-coloured Baladi (W)	Black-coloured Baladi (B)
Parents	GXR	GXW	GXB
F1	GR	GW	GB
Backcrossing	G X GR	G X GW	G X GB
Backcross	GR	GW	GB

Does of each strain were mated with bucks of the same strain for several generations until characters and colour were established.

## Origin of Gabali Rabbits

This is a medium-sized breed. There are two strains of rabbits in Egypt bearing the name 'Gabali', but they unlikely to be the same. One of these strains is found in the western

desert on the north Mediterranean coast and the other in Sinai. The two strains seem to be adapted to the desert conditions. The colour of rabbits is mainly grey. For the western coast rabbits, the Desert Research Center, Ministry of Agriculture, Egypt started a project in Mariout (North Western coast of Egypt) in 1992, to characterise this strain of Gabali rabbits. Another project funded by the Ministry of Agriculture, Egypt started in 1994 in the Faculty of Agriculture at Moshtohor,

*Table 2. Herd sizes of Giza White and Baladi rabbits in Governmental and small-scale farms.*

Item	Giza White		Baladi	
	Governmental farms	Small-scale herds	Governmental farms	Small-scale herds
Mean:				
Adult animals	40	5	30	3
Young animals	200	30	120	15
Range:				
Adult animals	20-80	2-10	20-50	1-6
Young animals	100-500	20-250	50-200	15-150

Source: Khalil, 1997.



*Figure 1. Baladi Red (Female).*

Zagazig University, Egypt to characterise Sinai Gabali rabbits genetically as well as to evaluate their crosses with the New Zealand White breed.

### Census Data and Herd Sizes

About 500 animals of Giza White and 1 000 animals of Baladi rabbits are the remaining rabbits of these two Egyptian breeds. Census data for Gabali rabbits in Egypt is not available. The approximate size of the herds is shown in table 2. Full details concerning census data were presented by Khalil (1997).

### Physical Description of Breeds/Strains

Giza White rabbits are albino with a soft silky fur. They have well-rounded hips, a well-filled loin and ribs that carry forward to combine with shoulders that balance with the rest of the body. The shoulders blend smoothly into midsection, and the midsection smoothly extends into the hindquarters. The body is of medium length with good depth as shown in table 3. The top body line rises in a gradual curve from the base of the ears to the centre of the hips and then fall in a smooth curve downward to the base of the tail. The sides taper slightly from hindquarters towards shoulders. The back is markedly

convex without animals being pot-bellied. The skin is smooth. Giza White rabbits have a convex head and pink eyes. They have erect ears, a straight tail and feet and legs of medium length.

For Baladi rabbits, there are three strains named Baladi Red (Figures 1 to 3), Baladi White and Baladi Black (Figures 4 to 6). The three strains of Baladi rabbit have well-rounded hips with a well-filled loin. The ribs are carried forward to combine with shoulders that balance with the rest of the body. The shoulders blend smoothly into the midsection, which smoothly extends into the hindquarters. The body is of medium length with a good depth as shown in table 3. The top body line rises in a gradual curve from the base of the ears to the centre of the hips and then falls in a smooth curve downward to the base of the tail. The sides taper slightly from the hindquarters towards the shoulders. The back is markedly ventrally convex without being pot-bellied. The skin is smooth. All three strains have a convex head, black eyes and erect ears. Feet and legs are medium in length, while tails are straight and relatively short.

### Sexual Maturity

Results given in table 4 show that Giza White rabbits are late in their sexual maturity compared to standard breeds (Khalil *et al*, 1989). On the other hand, Gabali rabbits reach their sexual maturity at an early age (about

Table 3. Averages of body measurements (cm) in Giza White and Baladi rabbits at 12 weeks of age.

Item	Giza White	Baladi Red	Baladi White	Baladi Black
Body length	25.0±0.14	23±0.18	21.6±0.13	28.3±0.16
Chest circumference	11.5±0.09	22±0.22	16.4±0.17	21.7±0.21
Loin width	4.6±0.03	4.6±0.03	4.0±0.03	4.6±0.04
Loin length			13.9±0.10	
Thigh circumference	9.0±0.18			11.1±0.25
Ear length		8.5±0.18	8.1±0.25	8.4±0.22

Source: Dora, 1979; Khalil, 1997.

*Table 4. Averages of age and weight of doe and buck at sexual maturity in Giza White, Baladi and Gabali rabbits.*

Item	Giza White	Baladi Red	Baladi White	Baladi Black	Siani Gabali
Age of buck at 1 <sup>st</sup> mating (month)	7.5±0.6	7.2 ±0.5	6.5±0.4	7.0±0.5	6.2±0.6
Age of doe at 1 <sup>st</sup> mating (month)	7.8±0.5	7.5±0.4	6.8±0.4	7.4±0.5	6.8±0.4
Age of doe at 1 <sup>st</sup> kindling (month)	9.5±0.8	8.5±0.8	7.7±1.2	8.6±0.9	
Weight of buck at 1 <sup>st</sup> service (g)	2 810±40	2850 ±38	2 250±80	2 830±56	
Weight of doe at 1 <sup>st</sup> mating (g)	2 910±66	2 970±42	2 300±80	2 850±68	3 200±87

Source: Dora, 1979; Tag El-Din, 1979& 1992; Khalil and Soliman, 1989; Khalil *et al*, 1989.



*Figure 2. Baladi Red (Male).*

6.5 months). Differences among Baladi strains in age of buck and doe at first service are small (Table 4) since the three strains mature at about 7 months of age (Soliman, 1983). On the other hand, Baladi White rabbits recorded the least adult weight (2 250 g), while Gabali rabbits recorded the highest adult weight (3 200 g). Baladi Red and Baladi Black are nearly similar in their adult weights (2 850 g).

### Lifetime Production per Doe

With full potentiality, the lifetime production of the Giza White doe could be extended for four years. Therefore, Giza White rabbits have a long lifetime production compared to other breeds raised in Egypt (Afifi and Emara, 1986). Doe longevity of this breed ranges from 4.2 to 6.5 years with an average of 4.5 years. The number of litters per doe per annum ranges from 2.2 to 4.2 with an average of 2.8.

Baladi strains of rabbits could be used for breeding for about 5 years. Therefore, they are characterised by long lifetime productions

compared to exotic breeds raised in Egypt (Afifi and Emara, 1986). Although this period is relatively long, the productivity of doe per annum is low. This low productivity is shown in Baladi rabbits where the number of litters per doe per annum ranges from 2.1 to 3.5.

### Semen Characteristics

Wide variation among Baladi strains in semen characteristics was observed (Table 5; Soliman, 1983). Semen of Baladi Red bucks recorded the highest ejaculate volume and sperm concentration as well as the least dead and abnormal sperm.

### Fertility, Fecundity and Prenatal Mortality

The conception rate of Giza White rabbits is relatively higher than that recorded for standard breeds raised in Egypt (Afifi and Emara, 1986). The estimate ranges from 65 to



Figure 3. Baladi Red (Bunnies).

Table 5. Averages of semen characteristics of 8-month bucks in Baladi strains of rabbits.

Trait	Baladi Red	Baladi White	Baladi Black
Reaction time (seconds)	21.0±1.52	18.0±1.52	22±0.98
Ejaculate volume (ml)	0.49±0.04	0.5± 0.04	0.38±0.52
Sperm concentration per ml (X10) <sup>6</sup>	383.0±8.36	360± 9.39	282± 6.50
Sperm abnormalities (%)	17.7±0.32	27±0.43	30.5±0.64
Dead sperm (%)	11.3± 0.32	20.3±0.38	22.6±0.40

Source: Soliman, 1988.

Table 6. Averages for fecundity traits in Giza White and Baladi rabbits.

Item	Giza White	Baladi Red	Baladi White	Baladi Black	Siani Gabali
Conception rate (%)		75.0±6.2	72±4.7	53.4±5.8	
Kindling interval (days)	48.0	66.6	58	55.0	61
Ovulation rate per litter	8.7±0.56				
Litter size:					
at birth (total born)	6.7±0.11	6.0 ± 0.40	5.3±0.52	5.5 ±0.48	5.91±0.81
at 21 days	6.0±0.12	4.8±0.38	4.4±0.45	4.4 ±0.42	6.0±0.80
at weaning (4 weeks)	5.8±0.12	4.8±0.38	4.5±0.45	4.2±0.40	4.0±0.89
at weaning (5 weeks)	4.5±0.11	4.6±0.39	4.5±0.48	3.8±0.40	3.9±0.92
Litter weight (g):					
at birth	330±5.8	322±21	320±8.3	258±22	360±50.2
at 21 days	1 380±38	1 040±68	960±32	990±42	
at weaning (4 weeks)	1 700±42	1 550±120	1 145±66.1	1 320±48	
at weaning (5 weeks)	1 950±51	1 780±151	1 675±184	1 520±120	2 260±524

Source: El-Fouly,1977; Khalil, 1980; Soliman,1988; Khalil, 1999.

80% with an average of 76%. The kindling interval ranged from 42 to 65 days with an average of 49 days (Khalil, 1993 & 1997).

Giza White rabbits are characterised by a high ovulation rate (El-Fouly *et al*, 1977) and moderate litter size and weight both at birth

and weaning (Afifi, 1971, Afifi and Emara, 1987). Litter weight and average weight of young at weaning for Giza White are heavier than those for the three strains of Baladi rabbits (Emara, 1982). Giza White rabbits have moderate embryonic mortality (about 12%

with range of 5-16%) along with moderate stillbirths (about 5.2% with range of 3.5-8.5%). Both embryonic mortality and stillbirths in Giza White rabbits are relatively lower than for Baladi strains (El-Fouly *et al.*, 1977). However, averages for litter traits in Giza White at different ages reviewed from literature (e.g. Mostageer *et al.*, 1970; Khalil, 1980; Khalil *et al.*, 1987a; Afifi and Khalil, 1989; Afifi *et al.*, 1989) indicate that the performance of Giza is acceptable as a meat-producing breed (Table 6).

Baladi strains of rabbits have medium to high conception rates ranging from 42% to 85%, while they have relatively long kindling intervals (Table 6). Also, the conception rate of Baladi strains is relatively lower than that recorded for Giza White rabbits (Afifi and Emara, 1986). Results given in table 6 indicate that the size and weight of Baladi White litters are slightly smaller and heavier than litters of Baladi Red and Baladi Black rabbits (Emara, 1982; Hassan, 1988; Soliman, 1988; Khalil *et al.*, 1988; Hilmy, 1991).

Prenatal mortality in Baladi rabbits is high compared to other standard breeds. The estimates range from 5 to 14% (El-Fouly *et al.*,

1977). However, both prenatal mortality (%) and stillbirths are very similar in the three strains of Baladi rabbits. Also, stillbirths of Baladi rabbits are similar to Gabali rabbits (Galal and Khalil, 1994; Khalil, 1996). The ranges were 3-12%, 4.5-15% and 3-13% young for Baladi Red, Baladi White and Baladi Black, respectively.

## Maternal and Lactation Behaviour

Reviewed means and ranges characterising lactating ability of Giza White and Baladi rabbits are presented in table 7 where data indicate a great variability in lactation performance of the Egyptian breeds of rabbits.

The milking ability of Giza White does is low compared to exotic breeds raised in Egypt (Ibrahim, 1985; Khalil, 1994). Although the Giza White breed is more adapted to the Egyptian conditions, the low post-natal maternal ability in such a breed (due to lower milking and suckling abilities ) may be the main limiting factor for the full use of such genetic potential on a large scale of

Table 7. Means and ranges characterising lactating ability of Giza White and Baladi rabbits.

Breed	Trait	Mean	Range
Giza White	Number of teats	8.0±0.15	7-10
	21-days milk yield (g)	2640±68	1 890-3 260
	Peak of lactation (in days)	18.5±0.6	16-23
	Peak of lactation (in g)	2 380±35.5	1 570-2 860
	Total milk yield (g)	3 750±97	2 650-4 280
	Fat (%)	19.5±0.4	17-23
	Protein (%)	15.7±0.1	12-18
	Lactose (%)	2.0±0.01	1.8-2.9
Baladi Red	21-days milk yield (g)	2 150±38	1 670-2 380
	Total milk yield (g)	3 200±55	2 480-4 180
Baladi Black	21-days milk yield (g)	2 180±42	1 650-2 480
	Total milk yield (g)	3 550±68	2 450-4 200
Gabali	21-days milk yield (g)	2 235±331	
	Total milk yield (g)	3 383±497	

Source: Ibrahim, 1985; Khalil, 1994, 1996 & 1999.





Figure 4. Baladi Black (Female).

commercial production. Peak lactation in this breed (2 380 g) was reached at 18 days after kindling. Milk components for Giza White rabbits are richer than those in standard breeds raised in Egypt (Ibrahim, 1985). The number of teats in this breed (average 8) is similar to that found in other breeds.

Baladi strains of rabbits (Baladi Red and Baladi Black) as well as Gabali rabbits are low in their lactating abilities to suckle their young, which may be a reason for these rabbits producing low litter size and weight at weaning, together with high mortality rates (Galal and Khalil, 1994; Khalil, 1996). Means and ranges given in table 7 indicate that the milk yield curve for Baladi rabbits is similar to that for Gabali. But, both breeds are very low in their milking ability compared with exotic breeds raised in Egypt. In this respect, total milk yield is about 3 300g in Baladi rabbits and 3 383 g in Gabali relative to 7 200 g for New Zealand White raised in Egypt.

## Body Weights and Gains (g) and Food Utilization

Prewaning daily feed intake per litter (0-5 weeks) for Giza rabbits is 195 g with a range of 160-225 g (Abdella *et al*, 1990). Accordingly, daily crude protein and starch per litter per doe during preweaning period were 32 and 120 g, respectively. In comparison with exotic breeds raised in Egypt, results given in table 8 indicate that post-weaning Giza White rabbits have:

- 1) moderate weights and gains in postweaning growth period (Afifi *et al*, 1990).
- 2) moderate daily feed intake of about 80 g during fattening period (Afifi *et al*, 1990).
- 3) low rate of feed conversion (5.2 g feed per gram gain).

Prewaning daily feed intake per litter (0-5 weeks) for Baladi Red and Baladi Black rabbits are about 230 and 240 g, respectively



Figure 5. Baladi Black (Male).

(Radwan *et al.*, 1978). It ranged from 160-255 g for Baladi Red and from 170 to 270 g for Baladi White rabbits.

Postweaning body weights and daily gains in Baladi rabbits are lower than those for native Giza White and for other exotic breeds raised in Egypt (e.g. New Zealand, Californian, Chinchilla, Bouscat, etc..) as cited by Khalil (1980), Afifi and Emara (1990), Tag El-Din *et al* (1992), Youssef (1992) and Afifi *et al* (1993) (Table 8). Contrary to Giza White, figures illustrated in this Table point out that feed intakes by Baladi rabbits are low (about 70 g during fattening period). On the other hand, feed conversion of 5.2 g feed intake per gram gain for Baladi Red is similar to that for Giza White (Boulos, 1978), while Baladi White had a higher conversion rate (about 4.2 feed intake per gram gain).

## Carcass Traits and Meat Composition

According to criteria and terminology cited by Blasco *et al* (1992), figures given in table 9 indicate that Giza White and Gabali rabbits are characterised by:

- early age at slaughter (12 weeks ) compared to Baladi strains;
- low weight of carcass compared to standard breeds raised in Egypt (El-Sayaad *et al*, 1990).
- light weight of fur;
- moderate content of moisture along with high content of protein in meat (El-Sayaad *et al*, 1990);

For Baladi rabbits, means given in table 9 indicate that the carcasses of Baladi Red and Black rabbits are characterised by:

- late age at slaughter (about 15 weeks for Baladi Red and Black and 18 weeks for Baladi White);

**Table 8. Averages for postweaning growth traits and rates of feed intake and conversion per young characterising Giza White and Baladi rabbits.**

Trait	Giza White	Baladi Red	Baladi White	Baladi Black	Gabali
Body weight (g)					
4 weeks (weaning)	355±4.8	318	312±5.7		587±56
5 weeks (weaning)	408±8.0	450±6.5	370±10.7		
6- week	560±10.2	530±8.2	460±14.5	512±12	796±62
8- week	790±13.9	785±10.8	595±21.0	744±16	1084±83
10- week	1 150±228	1 035±11.6	710±27.6	1 153±22	1 405±95
12- week	1 350±30	1 310±219	815±36	1 505±24	1 812±87
Daily gain (g)					
5-8 weeks	16.0±1.10	15.0±0.5	13.5±1.2	17.0±1.2	24±2.1
8-12 weeks	18.0±1.26	13.0±0.4	12.6±1.6	15.0±0.8	22±2.4
12-16 weeks	13.0±0.89	12.7±0.4	9.2±1.4	13.0±0.6	21±2.6
Daily feed intake (g)					
5-6 weeks	54±0.15	54±0.16			
6-7 weeks	68±0.18	68±0.18			
7-8 weeks	80±0.22	73±0.24			
8-9 weeks	88±0.28	86±0.35			
9-10 weeks	98±0.35	90±0.38			
Feed conversion <sup>+</sup>					
5-16 weeks	5.2±0.13	5.2±0.18	4.1±0.24	5.2±0.16	4.2±0.24
30-60 days		4.8±0.14	3.4±0.09		
30-90 days		5.2±0.18	4.6±0.10		

<sup>+</sup>Gram intake per gram gain.

Source: Dora, 1979; Khalil, 1980; Afifi *et al*, 1990; Galal and Khalil, 1994; Khalil, 1997 & 1999.

- moderate weight of hot carcass along with moderate weight of giblets, loin and head;
- moderate dressing percentage as well as low lean percentage and moderate meat:bone ratio;
- heavy weight of fur;
- moderate contents of moisture in meat together with high protein content.

However, carcass performance of Baladi strains is lower than that of standard breeds raised in Egypt (e.g. New Zealand White, Californian, etc...).

## Hair and Fur Traits

Averages for hair traits of adult Giza rabbits are presented in table 10. Giza White rabbits are a normal-haired breed with a hair length of 30-40 mm. Giza rabbits have a dense fur. Down-hairs of Giza are longer than those for standard breeds (e.g. Bouscat and Flemish Giant) raised in Egypt, while guard-hairs have an intermediate value (Ibrahim, 1988). Both down- and guard-hairs on hip and side

Table 9. Carcass traits and meat composition characterising performance of Giza White and Baladi rabbits.

Item	Giza White	Baladi Red	Baladi White	Baladi Black	Gabali
Carcass traits					
Slaughter age (weeks)	12	14	18	16	12
Pre-slaughter weight(g)	1 406±32	2 085±24	1 450±32	1 885±76	1 700±42
Hot carcass weight (g)*	650±26	1063±17	670±18	965±38	820±28
Dressing percentage	47.0	51	47	52	48.2
Giblets weight (g)	78±2.8	83±2.2	55±0.66	90±6.2	
Fur weight (g)	107±20.9	155±5.4	135±8.2	250±12.6	125±6.2
Abdominal fat (%)	5.2				
Loin weight (g)	192±26	138±18	90±6.2	140±17.8	95±8.4
Meat: bone (%)		78:22			
Lean percentage		65	64	78	
Head weight (g)	77±3.7	97±2.9	78±1.8	87±2.4	
Meat composition (%)					
Moisture	74	74.8	76.6	69.5	74
Protein	19	19.3	18.2	21.6	19
Ether extracts	2.4	2.1	3.4	6.4	2.6
Ash	1.4	1.2	1.6	3.4	1.2

\*Carcass without head.

Source: Dora, 1979; Youssef, 1992 Afifi *et al*, 1990 & 1994; Khalil, 1996 & 1997.

Table 10. Hair traits characterising fur of adult Giza White and Baladi rabbits.

Item	Giza White	Baladi Red	Baladi White	Baladi Black
Hair density (per mm <sup>2</sup> )	4 990	3 350	3 625	3 560
Length of down-hairs (mm)	22±0.11	24±0.12	23±0.14	23±0.14
Length of guard-hairs (mm)	33±0.12	38±0.28	36±0.28	36±0.28
Diameter of down-hairs (micron)	16±0.22	20±0.21	20±0.21	20±0.21
Diameter of guard-hairs (micron)	93±0.25	95±0.26	94±0.26	93±0.25
Hair medullation (%)	43±0.58	48±0.84	48±0.86	48±0.82

Source: Ibrahim, 1988.



Figure 6. Baladi Black (Bunnies).

regions have intermediate diameters while hairs on the back region are thin in diameter. Fibres have thinner medulla than the Baladi strains, while they are similar to those in standard breeds (e.g. Bouscat and Flemish Giant).

Baladi rabbits are normal-haired strains (35-40 mm in length). Length of down- and guard- hairs of the three strains of Baladi are longer than those hairs of standard breeds (e.g. Bouscat and Flemish Giant) raised in Egypt (Ibrahim, 1988). Diameter of down- and guard-hairs of Baladi strains are thicker than those of standard breeds. Hairs of Baladi strains have high percentages of medullation contributing to their light - density fur.

## Physiological reaction to heat stress

Gabali rabbits are less stressed to heat in comparison with the other Egyptian breeds (Giza White and Baladi). In summer,

physiological reaction parameters to heat stress are reasonable, 31°C for hair temperature, 142 for rate of respiration and 18-34°C for ear-lobe temperature (Khalil, 1996).

Under an average annual air temperature of 23.5°C, Giza White rabbits showed average values of 39.4°, 38.4°, 39.1°, 31.1° and 28.2°C for temperature of body, skin, abdomen, hair and ear-lobe (Shafie *et al*, 1970). The average respiration rate and pulse rate per minute were 169 and 235, respectively. New Zealand White rabbits gave similar average body temperatures at the same environmental air temperature. Physiological parameters reported by Kamar *et al* (1975), Hassanein (1980) and Toson (1983) for Giza white rabbits also indicated that this breed is less stressed to heat in summer compared to New Zealand White rabbits.

Different colours of black, red and white for Baladi strains showed highly significant differences in physiological reactions in terms of skin, ear-lobe and hair temperatures as well

as in respiration and pulse rates (Shafie *et al*, 1970). Under an annual average temperature of 23.5°C, Baladi strains are characterised by high responses to climatic stress. With regard to adaptation to heat stress, data obtained by Shafie *et al* (1970) and Toson (1983) show that in Baladi strains, the White rabbits are the most adapted and the Baladi Black rabbits the least.

## Genetic Parameters and Selection

Details on estimation of genetic and phenotypic parameters in Giza White and Baladi rabbits were presented in an article by Khalil *et al* (1986). Estimates of repeatability for litter traits, milk yield and reproductive intervals in Giza White rabbits were low, ranging from 0.02 to 0.189. Because of low repeatability for doe traits in this breed, selecting does for these traits based on a single production record would not be efficient from a genetic standpoint (Khalil, 1994). Heritabilities characterising genetic potential of economic traits in Giza White rabbits can be summarised as follows:

- 1) Estimates for litter traits are low, ranging from 0.05 to 0.27 (Khalil *et al*, 1987a; Khalil *et al*, 1989; Khalil, 1994).
- 2) Estimates for lactation traits (Khalil, 1993 & 1994), carcass traits (Darwish *et al*, 1970) and hair and fur traits (Ibrahim, 1980) are moderate or slightly high, about 0.18 for lactation traits, while they range from 0.20 to 0.29 for carcass traits and from 0.28 to 0.45 for hair traits.
- 3) Estimates for heat stress traits (Toson, 1983) and postweaning growth (Khalil *et al*, 1987b; Khalil and Khalil, 1991) are moderate or high, ranging from 0.28 to 0.45 for body temperature, 0.20 to 0.45 for respiration rate and 0.28 to 0.65 for postweaning body weights.

Repeatability for litter traits in Baladi strains of rabbits was low ranging from 0.11 to 0.18 (Khalil *et al*, 1988). Estimates of heritability for litter traits in Baladi strains

were higher than those for exotic breeds, i.e. additive genetic variability for litter traits in Baladi rabbits is higher than that in standard breeds. This is because the Baladi strains were not subjected to any intensive selection. These moderate estimates of heritability in Baladi strains are an incentive for Egyptian rabbit breeders to improve doe traits through selection.

## Acknowledgement

The author is grateful to Professor Salah Galal for his useful comments made during the writing of this article and also for the invitation to write this article for publication in *Animal Genetic Resources Information Bulletin*.

## References

- Abdella, M.M., Afifi, E.A., El-Sayaad, G.A.E. & El-Madhagi, K.S.S. 1990. Effect of dietary protein level, fiber level and other factors on rabbit performance. I - Productive performance of rabbit does. *Annals of Agric. Sci., Moshtohor, Egypt*, 28(4): 2101-2112.
- Afifi, E.A. 1971. A study of some economic and productive characters in some breeds of rabbits and their crosses. Ph.D. Thesis, Fac. of Agric., Ain-Shams Univ., Egypt, pp. 580.
- Afifi, E.A. & Emara, M.E. 1986. Conception rate and number of litters kindled by the rabbit doe per year in Egypt. 3<sup>rd</sup> International Colloquy "The Rabbit as a Model Animal and Breeding Object.", Section 1, Rostock, 11-13 September 1986.
- Afifi, E.A. & Emara, M.E. 1987. Litter size in local Egyptian and exotic breeds of rabbits and their crosses. *Journal of Applied Rabbit Research*, 10 (1): 26-29.

- Afifi, E.A. & Emara, M.E.** 1990. Breed group and environmental factors influencing postweaning daily gain in weight of purebred and crossbred rabbits. *Journal of Applied Rabbit Research* 13: 114-118.
- Afifi, E.A. & Khalil, M.H.** 1989. Observations on purebred and crossbred litters of Giza White and Grey Giant Flander rabbits in Egypt. *Journal of Applied Rabbit Research*, 12: 273-277.
- Afifi, E. A., Khalil, M. H & Emara, M. E.** 1989. Effects on maternal performance and litter preweaning traits in doe traits. *Journal of Animal Breeding and Genetics* 106: 358-362.
- Afifi, E.A., Abdella, M.M., El-Sayaad, G.A.E. & El-Madhagi, K.S.S.** 1990. Effect of dietary protein level, fiber level and other factors on rabbits performance. I- Growth traits, postweaning mortality, feed utilization and nutrients digestibility of growing rabbits. *Annals of Agric. Sci., Moshtohor*, 28 (4): 2115-2139, Egypt.
- Afifi, E.A., Khalil, M.H., Khadr, A.F. & Youssef, Y.M.K.** 1993. Heterosis, maternal and direct effect for postweaning growth traits and carcass performance in rabbit crosses. *Journal of Animal Breeding and Genetics*, 110: 1-10, Germany.
- Badawy, A.G.** 1975. *Rabbit Raising*. Central Administration for Agricultural Culture, Ministry of Agriculture, Egypt (2<sup>nd</sup> Edition, In Arabic), pp. 75.
- Blasco, A., Ouhayoun, G. & Masoero, G.** 1992. Study of rabbit meat and carcass: Criteria and terminology. *Option Méditerranéennes-Série Séminaires*, No. 17: 105-120.
- Bolet, G., Baselga, M., Monnerot, M., Rouvier, R., Roustan, A. & Brun, J.M.** 1996. Evaluation, conservation and utilization of rabbit genetic resources: Situation and prospects in the Mediterranean region and in Europe. 6<sup>th</sup> World Rabbit Congress, France, Toulouse, July 1996, Vol. 2: 249-254.
- Boulos, N.Z.** 1978. Effect of feeding different sources and levels of roughages on growing rabbits. M.Sc. Thesis, Cairo University, Egypt, pp. 92.
- Darwish, H.I., Mostageer, A.M. & Ghany, M.A.** 1970. Genetic and phenotypic parameters of carcass characteristics in Giza rabbits. *Egyptian Journal Animal Production*, 10(1): 13-19.
- Dora T.M.** 1979. Body size, feed efficiency and meat production in White Baladi, Bouscat and their crossbreds. M.Sc. Thesis, Mansoura University, Egypt, pp. 133.
- El-Fouly, M.A., Borady, A.A., Radwan, A.A. & Kamar, G.A.R.** 1977. Seasonal variation in some reproductive traits of Bouscat and Giza White rabbits. *Egyptian Journal of Animal Production*, 17(1): 9-19.
- El-Khishin, A.F., Badreldin, A.L., Oloufa, M.M. & Kheireldin, M.A.** 1951. Growth development and litter size in two breeds of rabbits. *Bulletin No. 2, Faculty of Agriculture, Cairo University, Egypt*, pp. 29.
- El-Sayaad, G.A.E., Afifi, E.A., Abdella, M.M. & El-Madhagi, K.S.S.,** 1990. Effect of dietary protein level, fiber level, breed and other factors on rabbit performance. III. Carcass traits, meat composition and blood components of growing rabbits. *Annals of Agricultural Science, Moshtohor, Egypt*, 28(4): 2141-2165.
- Emara, M.E.A.** 1982. Effect of crossbreeding on some productive traits in rabbits. Ph. D. Thesis, Fac. of Agric. Moshtohor, Zagazig Univ., Banha Branch, Egypt, pp. 248.
- Galal, E.S.E. & Khalil, M.H.** 1994. Development of rabbit industry in Egypt. *Options Méditerranéennes, Spain*, 8: 43-56.

- Hassan, N. S.** 1988. Production of rabbits in Egypt. M. Sc. Thesis, Fac. Agric., Cairo University, Egypt, pp. 127.
- Hassanein, A.M.** 1980. Reproductivity of rabbits under different heat conditions. M. Sc. Theses, Faculty of Agriculture, Cairo University, Egypt, pp. 117.
- Hilmy, A. F.** 1991. Some productive aspects in rabbits. M. Sc. Thesis, Fac. of Agric., Moshtohor, Zagazig Univ., Egypt, pp. 177.
- Ibrahim, M.K.** 1988. Some hair characteristics of different native and standard rabbit breeds. 4<sup>th</sup> World Rabbit Congress, WRSA, Budapest, 10-14 October, pp. 340.
- Ibrahim, F.A.** 1985. Studies on some factors affecting reproduction performance, milk production and preweaning mortality in rabbits. M. Sc. Theses, Faculty of Agriculture, Cairo University, Egypt, pp. 101.
- Kamar, G.A.R., Shafie, M.M., Abdel-Malek,** 1975. The ear lobes of rabbits as a site of body temperature regulation. Egyptian Journal of Animal Production, 15(1): 57-66.
- Khalil, M.H.,** 1980. Genetic and environmental studies on some productive traits in rabbits. M.Sc. Theses, Faculty of Agriculture at Moshtohor, Zagazig University, Egypt, pp. 246.
- Khalil, M.H.,** 1993. Genetic evaluation of the lactational performance in Giza White rabbits and its relation with preweaning litter traits. Egyptian J. Rabbit Science, 3(1): 113-127.
- Khalil, M.H.,** 1994. Lactational performance of Giza White rabbit and its relation with preweaning litter traits. Animal Production , 59:141-145, UK.
- Khalil, M.H.** 1996. Breeds of rabbits in desert areas. Symposium on development of Rabbit Industry in Sinai. Sinai, 24-27 September 1996, Suez Canal University, Egypt, (Arabic Article), pp. 24-35.
- Khalil, M.H.** 1997. Model for the description of Rabbit Genetic Resources in Mediterranean countries. Application to the Egyptian breeds Giza White and Baladi. CIHEAM, Spain (Booklet), pp. 41.
- Khalil, M.H.** 1999. Heterosis, maternal and direct genetic effects for litter performance and postweaning growth in Gabali rabbits and their crosses raised under hot climatic conditions. J. King Saud University, Agric. Sci, 11(2): 131-146.
- Khalil, M.H. & Soliman, A.M.** 1989. Genetic analysis for some reproductive traits in doe rabbits. Journal of Applied Rabbit Research, (4): 205-208.
- Khalil, M.H. & Khalil, H.H.** 1991. Genetic and phenotypic parameters for weaning and preweaning body weights and gain in Bouscat and Giza White rabbits. Journal of Applied Rabbit Research, 14: 44-51.
- Khalil, M.H., Owen, J.B. & Afifi, E.A.** 1986. A review of phenotypic and genetic parameters associated with meat production traits in rabbits. Animal Breeding Abstracts (1986), U.K., 54(4): 752-749.
- Khalil, M.H., Owen, J.B. & Afifi, E.A.** 1987a. A genetic analysis of litter traits in Bauscat and Giza White rabbits. Animal Production, 45: 123-134.
- Khalil, M.H., Afifi, E.A. & Owen, J.B.** 1987b. A genetic analysis of body weight traits in young Bauscat and Giza White rabbits. Animal Production, 45: 135-144.
- Khalil, M.H., Afifi, E.A. & Kadry, A.E.H.** 1989. Genetic analysis of weight of doe rabbits during gestation and its phenotypic



relationship with reproductive efficiency at kindling. *Journal of Applied Rabbit Research*, 12(1): 45-51.

**Khalil, M.H., Afifi, E.A., Emara, M.E. & Owen, J.B.** 1988. Genetic and phenotypic aspects of doe productivity in four breeds of rabbits. *J. Agric. Sci., Cambridge* 110: 191-197.

**Mostageer, A., Ghany, M.A. & Darwish, H.I.** 1970. Genetic and phenotypic parameters for the improvement of bodyweight in Giza rabbits. *Egyptian Journal of Animal Production*, 10(1): 65-72.

**Radwan, M.A.H., Abdella, M.M., Bakir, A.A. & El-Maghrabi, M.M.** 1978. Studies on some nutritional requirements for two local breeds of rabbits during reproduction and growing periods. *Annals of Agricultural Science, Moshtohor, Egypt*, 10: 245-255.

**Shafie, M.M., Abdel-Malek, E.G., El-Issawi, H.F. & Kamar, G.A.R.** 1970. Effect of environmental temperature on physiological body reactions of rabbits under subtropical conditions. *Egyptian Journal of Animal Production*, 10(1): 133-149.

**Soliman, F.N.K.** 1983. Genetic and physiological studies in rabbits. The effect of crossing on rabbits performance. M. Sc. Thesis, Fac. of Agric., Alexandria Univ., Egypt.

**Soliman, F.N.K.** 1988. Genetic and physiological studies in rabbits: evaluation of pre- and post- weaning performance for different breeds of rabbits. Ph.D. Thesis Fac. of Agric., Alexandria Univ., Egypt, pp. 247.

**Swapfbs, 1993.** Statistics of Wealth for Animal, Poultry, Fish, Bees, and Silk, 1991-1993, Bulletin Published by Economic Sector, Ministry of Agriculture, Egypt.

**Tag El-Din, T.H.** 1979. A comparative study of reproduction, mortality and body weight in White Baladi and Bouscat rabbits and their crossbreds. M.Sc. Thesis, Mansoura University, Egypt, pp. 131.

**Tag El-Din, T.H., Ibrahim, Z.M.K. & Oudah, S.M.** 1992. Studies on live body weight and litter size in New Zealand White, Californian, Baladi rabbits and their crossbreds in Egypt. *Options Méditerranéennes, Spain*, 8:67-74.

**Toson, M.A.** 1983. Genetic differences of heat tolerance and their effects on some productive traits in rabbits. M.Sc. Theses, Faculty of Agriculture at Moshtohor, Zagazig University, Egypt, pp. 99.

**Youssef, M.K.** 1992. The productive performance of purebred and crossbred rabbits. M. Sci. Thesis, Fac. of Agric., Moshtohor, Zagazig Univ., Egypt, pp. 182.

.....

.....

## ICAR Technical Series no. 2. Cattle Identification and Milk Recording in Central and Eastern European Countries

Editors: T. Vares, M. Zjalic & C. Mosconi

Proceedings of an International Workshop held in Warsaw, Poland on 23 August, 1998, jointly organised by ICAR, FAO, EAAP and CHSZ.

ICAR, Villa del Ragno, Via Nomentana 134, 00162 Rome, Italy

Tel.: +39-06-86329141; fax: +39-06-86329263;

e-mail: zoorec@rmnet.it

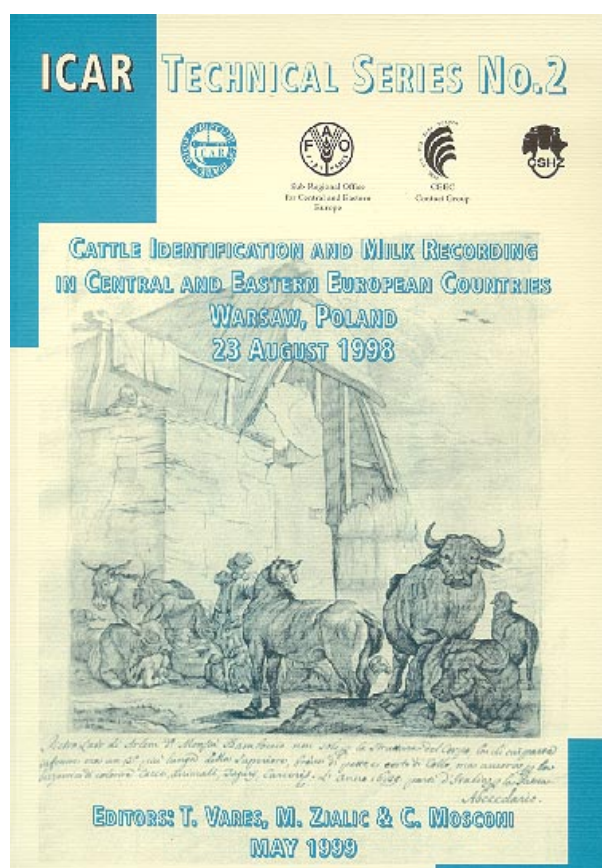
pp. 135

In all countries of Central and Eastern Europe there are well organised and functional milk recording services. From the organisational point of view, the major part of them is established as independent entities operating under the license issued by the Ministry of Agriculture. They apply ICAR (International Committee for Animal recording) guidelines and control methods in accordance with the local conditions, farm size and costs of operations.

An overview of the current status of milk recording, cattle identification and ICAR membership status in Central and Eastern Europe are presented in this publication, following the workshop held in Warsaw in August 1998. The workshop was attended by 35 experts and a total of 18 papers, including a majority of case study, were presented.

The full proceedings (135 pages) of this most informative workshop were published in May 1999 in this second publication of the ICAR Technical Series.

The Workshop was a joint venture by ICAR, FAO (Sub-Regional Office for Central and Eastern Europe and the Animal Production Division), EAAP (European Association for Animal Production) and CHSZ (Central Animal Breeding Office, Poland).



## 100 years Swiss Brown Cattle Breeders' Federation

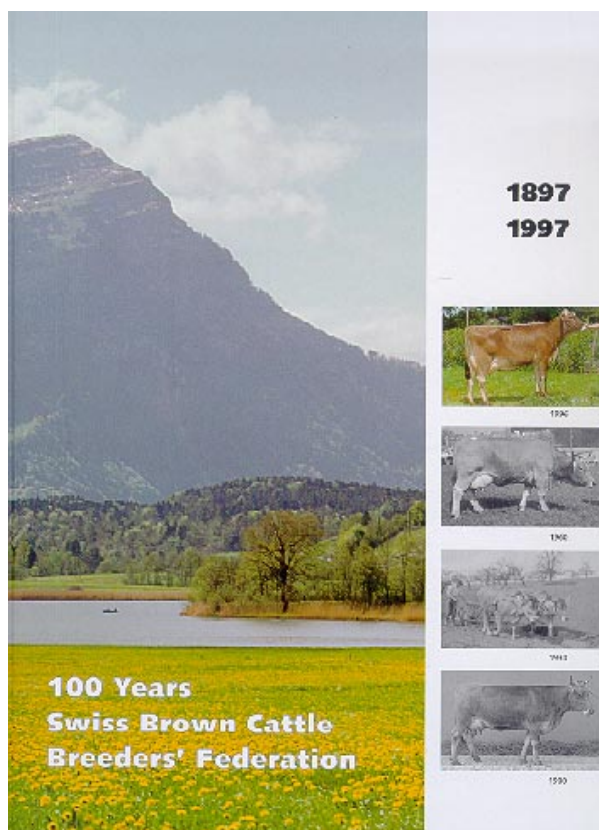
Editors: M. Harder & O. Grüter

Production: Kündig Druck AG, 6304 Zug, 1997  
pp. 145

The 100 year old history of the Swiss Brown Cattle Breeders' Federation, summarised in this publication, reflects the impact of events around the farmers families, as well as the impact of society and nature surrounding animal breeders. The particular geography of Switzerland with its mountainous and alpine regions as well as lovely meadows and pastures has decisively influenced animal breeding. Influenced by the relatively rich touristic land of Switzerland and by the narrow valleys of many breeders, peculiar and original thoughts developed on the method of how Brown Cattle breeding should be carried out. The reader can find almost any kind of breeder from the traditional, the persistent, the leisurely progressive up to the innovative and restless farmer; and many believe to have found the ultimate truth. The Swiss Brown Cattle Breeders' Federation has the task to harmonise these different views and to show the way to the future at the right time. The accomplishment of this difficult task is a challenge for the responsible people and does not allow them to linger in their endeavour to keep the Brown Cattle competitive.

The present publication is a concise cross-section of the history of Brown Cattle breeding in Switzerland and represents an account of the present breeding activities written by many authors. The member of the board, Markus Harder who has designed the jubilee publication has coordinated the different contributions and followed the development of this publication with expert knowledge.

The publication, rich in photos, graphics and diagrams, is particularly well designed and full of useful information, summarising



the first centenary of the Brown Cattle Breeders' Federation. The present jubilee publication should not be anything more than just what it is, a celebration paper. It should stimulate the readers to deal with Brown Cattle breeding, bring about enjoyment and finally make the authors ponder further on the task of animal breeding.

The book is written in English, German, French and Italian.

## Commercialisation of indigenous goat production and products in South Africa

Editor: M. Smuts

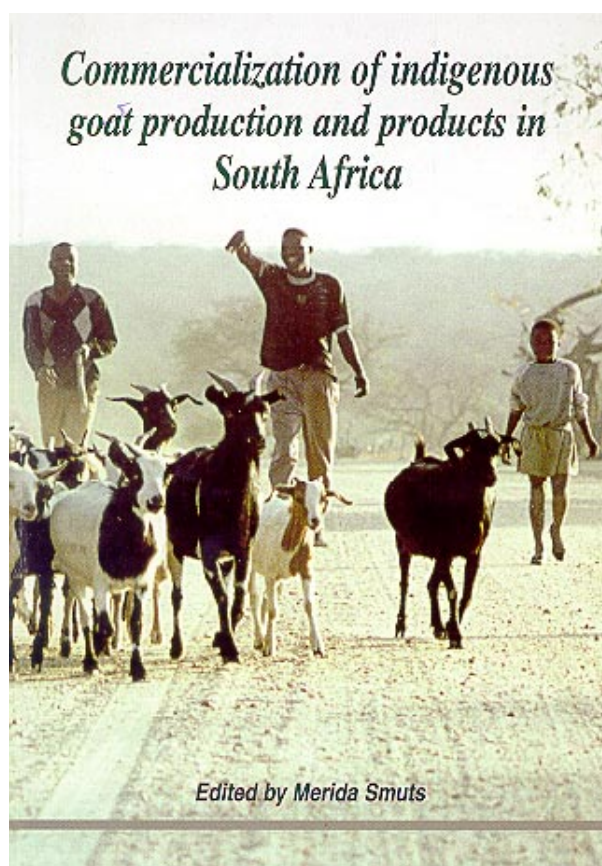
Proceedings of a Workshop held in the Animal Nutrition and Products  
Institute of A.R.C., Irene, South Africa , 24 June 1997.  
Advisory Bureau for Development, Aries Street, Waterkloof Ridge, 0181  
Pretoria, South Africa  
pp. 129

Published in 1998, this booklet of 130 pages summarises the proceedings of a workshop held at the Irene based National Institute for Animal Nutrition and Products. A total of 57 academics, scientists and technicians attended and presented a vast panorama of the state of the art of the goat sector in South Africa: research, economic, social management and diseases, breeding, selection feeding and marketing factors.

The very broad spectrum of South Africa's goat sector, from cashmere to hair, from skin and leather to handicrafts, from milk production to meat boer goat is presented and clearly exposed in this interesting publication.

Both large scale and communal farming are presented and discussed and the role of the various breeds, types and systems communities described. In fact, nearly 2/3 of the total goat population is found in the region where the workshop was organised.

The reason for holding this workshop lies in a collective wish to take stock and to try and coordinate the work that has, and still needs to be done, whether in research, extension and training. And secondly, it also follows from a decision made by a meeting of the Agricultural Committee Working Group of the USA -RSA Binational Commission. This working group proposed that a plan should be set which will provide for the whole process of the development of small-scale goat farming.



## First National Congress of the Spanish Society on Animal Genetic Resources (SERGA)

Proceedings of the first SERGA Congress held in Cordoba, Spain  
on the 14-17 December 1997.

Suppl. Archivos de Zootecnia, 1998

Instituto de Zootecnia. Facultad de Veterinaria, Avda. Medina Azara 9,  
14005 Cordoba, Spain

Tel.: +34-957-218743; Fax: +34-957-218666;

e-mail: Pa1gocag@lucano.yco.es

(In Spanish)

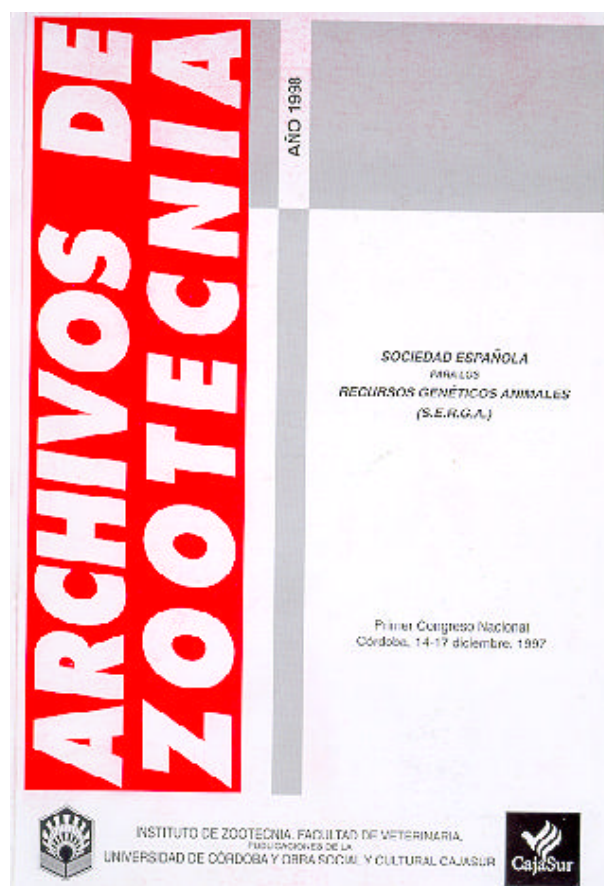
pp. 600

This large publication covers the full proceedings of the 1<sup>st</sup> Congress of the Spanish Society on Animal Genetic Resources (SERGA). The Congress was part of the celebration of the 150<sup>th</sup> Anniversary of the foundation of the veterinary centre of Cordoba and the 25<sup>th</sup> Anniversary of the constitution of the University of Cordoba.

The Congress was opened by an invited speech on "Disease threats to genetic conservation: BSE in Britain" by Lawrence Alderson and 80 communications (papers, short communications and posters) were proposed in three consecutive sessions:

- Genetic and conservation plans;
- Reproduction;
- Ethnozootecnics and breed characterisation.

These important proceedings cover successfully the full spectrum of Animal Genetic Resources in the Spanish provinces, from ruminants to deers and rabbits and from bees to swine, dogs and equides. Some additional information from Latin America (Mexico, Uruguay Argentina etc....) are also presented.



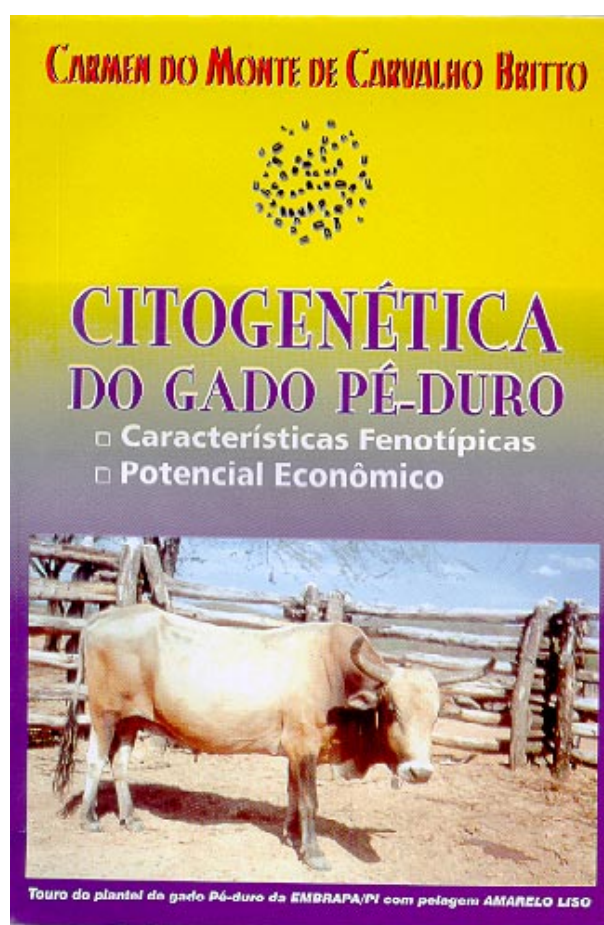
**Citogenética do Gado Pé-Duro.  
Características fenotípicas, potencial econômico  
(Cytogenetics of Pe-Duro cattle.  
Phenotypic characteristics and economic potential)**

Ed.: Carmen do Monte de Carvalho Britto  
EDUFPI, 1998  
(In Portuguese)  
pp. 95

This short booklet gives details on the cytogenetic, phenotypic characteristics and economic potential of the Brazilian Pé-Duro cattle breed.

After a brief summ-up of its origin, differentiation from the other national breeds (like Criollo, Pantaneiro, Caracu, Franqueiro etc...) and actually conservation efforts (performed by EMBRAPA), the author shows her studies carried out on the breed for the characterisation of the genomic pattern.

Photos of Pé-duro chromosomes illustrate its peculiarities and its phylogenetic relationship with the European breeds; also the similarities with other domestic breeds by means of clear reconstruction of the genetic material are shown.



## Genebanks and the conservation of farm animal genetic resources

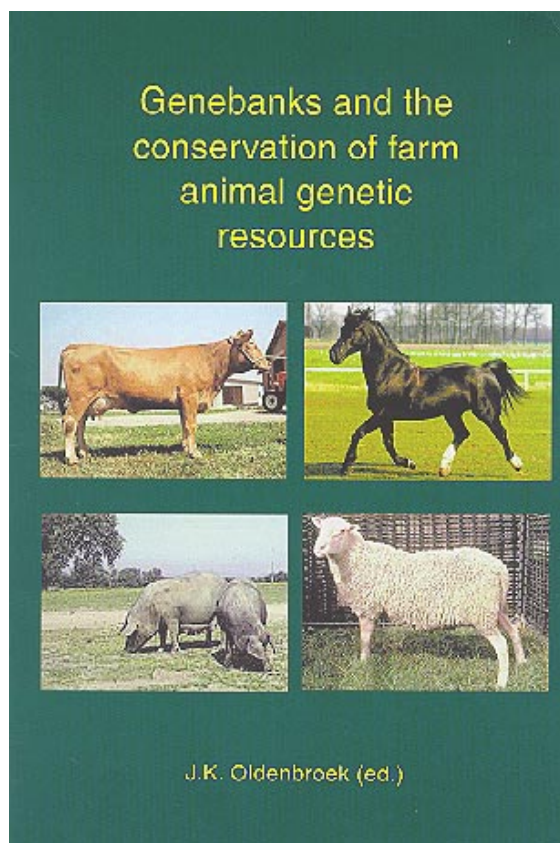
Ed.: J.K. Oldenbroek  
 DLO, Institute for Animal Science and Health, P.O. Box 65, 8200 AB  
 Lelystad, The Netherlands  
 ISBN 90-75124-06-6  
 pp. 120

Economic, social and environmental developments were the driving force for the selection of high productive breeds to be used in the intensive animal production systems. This selection decreased the contribution of locally developed breeds with lower-input, lower-output levels to food production and threatened the existence of these breeds.

So far, several organisations were active in the field of conserving animal genetic resources, e.g. the European Association for Animal Production (EAAP) and the Food and Agricultural Organisation of the United Nations (FAO). This book can be seen as an addition to the work published by EAAP and FAO, especially as an addition to the "Primary Guidelines for Development of National Farm Animal Genetic Resources Management Plans" of FAO published in 1998.

Within the Concerted Action BI04-CT96-0197 three meetings were held in 1997 and 1998 in which several aspects of conservation of genetic variation in farm animal populations in Europe were presented and discussed in order to develop guidelines for the cryoconservation of farm animal genetic diversity. Much attention was paid to the integration of the *ex situ* conservation in a genebank in programs for *in situ* conservation in EU circumstances. Geneticists from Scotland, Norway, Finland, France, Italy, Spain, The Netherlands and from FAO participated in these meetings. In a fourth meeting in 1998 they synthesised these aspects and discussions for publication in this book.

The readers of the book might be people working in education, in research, in animal breeding and in governmental and



non-governmental organisations. This book will help them to stimulate awareness for the problems resulting from the extinction of breeds and create awareness for the opportunities of conservation of genetic diversity within species by the creation and use of genebanks and management of farm animal genetic resources in the EC.

The contents of the book will help people, who should make decisions on conservation activities for farm animals, to found their viewpoints.



## Livestock and the environment

Ed.: A.J. Nell

International Agricultural Centre, P.O. Box 88, 6700 AB

Wageningen, The Netherlands

Tel.: +31-317-490111; fax: +31-317-418552; e-mail: iac@iac.agro.nl

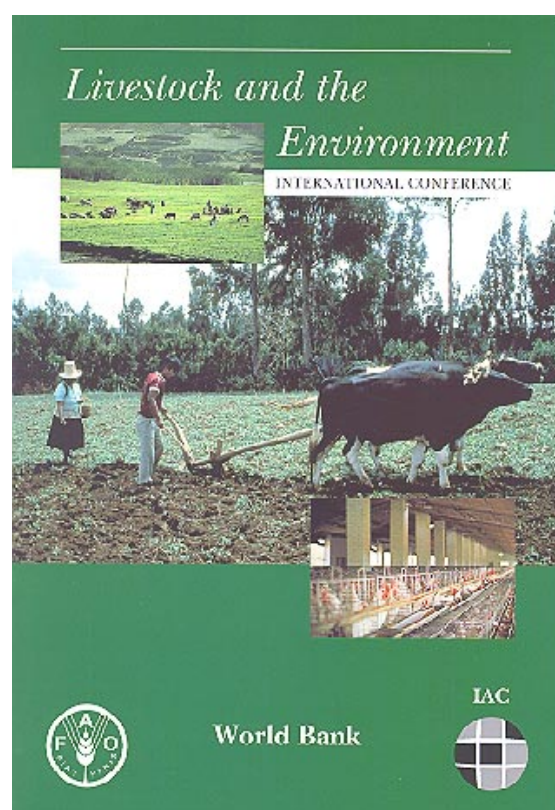
ISBN 90-70785-14-5

One of the greatest challenges faced by mankind is to satisfy the needs of the fast growing global population and at the same time preserve land, water, air and biodiversity resources. Livestock are a crucial element in this balancing process. Demand for livestock products is growing fast. Livestock, through their multiple functions, are a cornerstone of the livelihood of most of the rural population in the developing world. On the other hand, livestock use around 60 percent of the world's land area, including one fifth of the world's crop lands, and therefore interact directly and indirectly with a large part of the world's natural resources. Positioning livestock in such a way that it can satisfy future demands, while preserving the natural resource base, is therefore a critical element of sustainable agricultural development.

With this challenge in mind, a group of bilateral and multilateral development agencies requested FAO, the World Bank and USAID to lead the preparation of a major study on livestock - environment interactions. With the help of the international scientific community a state - of - the - art review on livestock - environment interactions has been prepared. The International Conference on Livestock and the Environment was held to share this information with a much broader audience and to translate the information into concrete guidelines for regional and national policies. The International Conference further aimed at formulating follow - up actions and identifying pilot activities to test innovative approaches.

The proceedings of this conference contain the papers presented, and the conclusions and recommendations of the conference

workshops. The recommendations will serve as a guideline for the Steering Committee of the Livestock - Environment Initiative to initiate follow - up action. A translation of the recommendations into Spanish and French is also included in the proceedings.

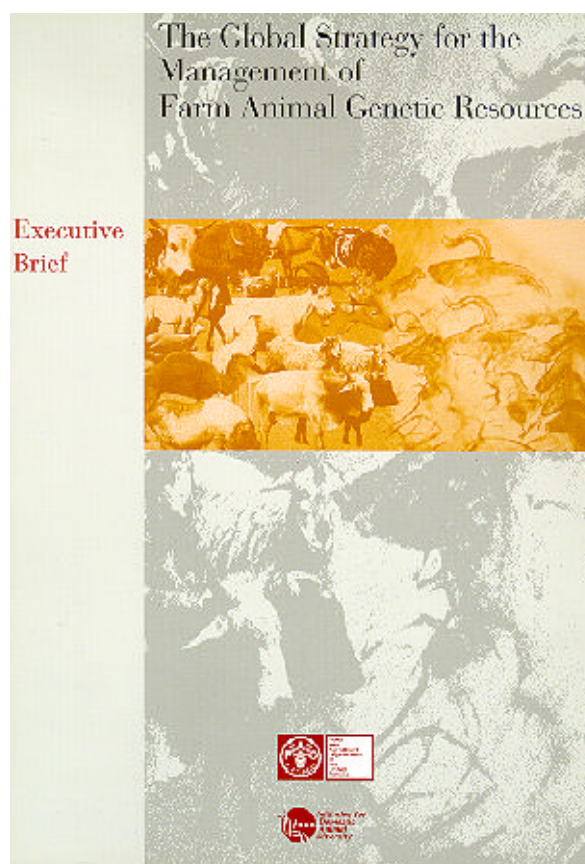


---

## The Global Strategy for the Management of Farm Animal Genetic Resources: Executive Brief

Published by FAO, 1999, pp 43,  
ISBN 92-5-104267-5

This easy to read quality-print publication is intended for the non-specialised reader. It explains through text and many charts, photos and boxes the FAO Global Strategy for the Management of Farm Animal Genetic Resources, its justifications, constituents and mechanisms. The document defines what are the farm avian and animal genetic resources being considered by the Global Strategy and describes their role in satisfying human needs. It highlights the need to sustain biodiversity among and within these genetic resources for the sustainable development of agriculture and for food security. The publication includes a glossary of terms frequently used in the field of biodiversity especially for animal and avian genetic resources.



## Editorial Policies and Procedures

The mission of the Animal Genetic Resources Information Bulletin (AGRI) is the promotion of information on the better use of animal genetic resources of interest to food and agriculture production, under the Global Strategy for the Management of Farm Animal Genetic Resources. All aspects of the characterization, conservation and utilization of these resources are included, in accordance with the Convention on Biological Diversity. AGRI will highlight information on the genetic, phenotypic and economic surveying and comparative description, use, development and maintenance of animal genetic resources; and on the development of operational strategies and procedures which enable their more cost-effective management. In doing this AGRI will give special attention to contributions dealing with breeds and procedures capable of contributing to the sustainable intensification of the world's medium to low input production environments (agro-ecosystems), which account for the substantial majority of the land area involved in livestock production; the total production of food and agriculture from livestock; and of our remaining farm animal genetic resources.

Views expressed in the paper published in AGRI represent the opinions of the author(s) and do not necessarily reflect those of the institutions which the authors are affiliated, FAO or the Editors.

The suitability of manuscripts for publication in AGRI is judged by the Editors and reviewers.

## Electronic publication

AGRI is available in full electronically on the Internet, in addition to being published in hard copy, at:

<< <http://www.fao.org/dad-is>>>

## Types of Articles

The following types of articles are published in AGRI.

### Research articles

Findings of work on characterization, conservation and utilization of farm animal genetic resources (AnGR) in well described production environments, will be considered for publication in AGRI. Quality photographs of these genetic resources viewed in the primary production environment to which they are adapted, accompanying the manuscripts are encouraged.

### Review articles

Unsolicited articles reviewing agro-ecosystems, country-level, regional or global developments on one or more aspects of the management of animal genetic resources, including state-of-the-art review articles on specific fields in AnGR, will be considered for publication in AGRI.

### Position papers

Solicited papers on topical issues will also be published as deemed required.

### Other published material

This includes book reviews, news and notes covering relevant meetings, training courses and major national, regional and international events and conclusions and recommendations associated with the outcomes of these major events. Readers are encouraged to send such items to the editors.

## Guidelines for Authors

### Manuscript submission

Manuscripts prepared in English, French or Spanish with an English summary and

another summary in either French or Spanish, should be submitted to AGRI Editor, AGAP, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy. Alternatively a manuscript may be sent as a WinWord Electronic Mail attachment to < agri@fao.org >. Photographs, coloured or black and white, and figures must be always sent by mail.

Manuscripts should be typed double-spaced and with lines numbered in the left margin. All pages, including those of references, tables etc., must be consecutively numbered. The corresponding author is notified of the receipt of a manuscript.

For manuscripts that are accepted after revision, authors are encouraged to submit a last version (3½" disc format) in Word 6.0 for Windows of their revised manuscript along with the printed copy.

### *Preparation of the manuscript*

The first page of the manuscript must include the running head (abbreviated title), title, names of authors, institutions, full addresses including postal codes and telephone number and other communication details (fax, e-mail, etc.) of the corresponding author. The running head not exceeding 45 characters plus spaces, should appear at the top of page 1 of the manuscript entirely in capital letters. The title of the manuscript is typed in upper and lower case letters. The title should be as brief as possible not exceeding 150 characters (including spaces) with species names when applicable. Authors, institutions and addresses are in upper and lower case italics. There is one blank line between the title and the authors. Addresses are typed as footnotes to the authors after leaving one blank line. Footnotes are designated numerically. Two lines are left below the footnotes.

### *Headings*

Headings of sections, for example Summary, Introduction, etc., are left-justified. Leave two blank lines between addresses footnotes and Summary and between the heading Summary and its text. Summary should not exceed 200

words. It should be an objective summary briefly describing the procedures and findings and not simply stating that the study was carried on such and such and results are presented, etc. Leave one line between the summary text and Keywords which is written in italics as well as the keywords themselves. All headings of sections (14 regular) and sub-sections (12 regular) are typed bold and preceded and succeeded by one blank line and their text begins with no indentation. The heading of a sub-subsection is written in italics, and ends with a dot after which the text follows on the same line. Keywords come immediately after the summaries. They should be no more than six, with no "and" or "&".

### **Tables and figures**

Tables and figures must be enclosed with the paper and attached at the end of the text according their citation in the document. Photos will not be returned

#### *Tables*

Tables, including footnotes, should be preceded and succeeded by 2 blank lines. Table number and caption are written, above the table, in italics (12) followed by a dot, then one blank line. For each column or line title or sub-title, only the 1st letter of the 1st word is capitalized. Tables should be numbered consecutively in Arabic numerals. Tables and captions should be left justified as is the text. Use horizontal or vertical lines only when necessary. Do not use tabs or space-bar to create a table but only the appropriate commands.

#### *Figures*

Figures including titles and legends should be preceded and succeeded by two blank lines. Figure number and title are written, below the figure, in italics (12) and end with a dot. The term figures includes photos, line drawings, maps, diagrams etc.

All the submitted diagrams, must be

.....

accompanied with the original matrix of the data used to create them. It is strongly advised to submit diagrams in Word 6.0 or Excel 5.0. Figures should be numbered consecutively in Arabic numerals.

## References

Every reference cited in the text should be included in the reference list and every reference in the reference list should have been mentioned in the text at least once. References should be ordered firstly alphabetically by the first author's surname and secondly by year.

Example for reference in a periodical is:

Köhler-Rollefson, I., 1992; The camel breeds of India in social and historical perspective. *Animal Genetic Resources Information* 10, 53-64.

When there are more than one author:

Matos, C.A.P., D.L. Thomas, D. Gianola, R.J. Tempelman & L.D. Young, 1997; Genetic analysis of discrete reproductive traits in sheep using linear and nonnlinear models: 1. Estimation of genetic parameters 75, 76-87.

For a book or an ad hoc publication, e.g., reports, theses, etc.:

Cockril, W.R., (Ed), 1994; *The Husbandry and Health of the Domestic Buffalo*. FAO, Rome, Italy, pp 993.

For an article in the proceedings of a meeting:

Hammond, K., 1996; FAO's programme for the management of farm animal genetic resources. In C. Devendra (Ed.) *Proceedings of IGA/FAO Round Table on the Global Management of Small Ruminant Genetic Resources*, Beijing, May 1996, FAO, Bangkok, Thailand, 4-13.

Where information included in the article has been obtained or derived from a World Wide Web site, then quote in the text, e.g. "derived from FAO. 1996" and in the References quote the URL standard form:

FAO, 1996; *Domestic Animal Diversity Information System* <<http://www.fao.org/dad-is/>>, FAO, Rome

.....

## Normes et règles éditoriales

L'objectif du Bulletin d'Information sur les Ressources Génétiques Animales (AGRI) est la vulgarisation de l'information disponible sur la meilleure gestion des ressources génétiques animales d'intérêt pour la production alimentaire et agricole, d'après les recommandations de la Stratégie Mondiale pour la Gestion des Ressources Génétiques des Animaux Domestiques. Tous les aspects relatifs à la caractérisation, la conservation et l'utilisation de ces ressources seront pris en considération, suivant les normes de la Convention pour la Biodiversité.

AGRI désire diffuser de l'information sur la génétique, les enquêtes phénotypiques et économiques et les descriptions comparatives, l'utilisation et la conservation des ressources génétiques animales, ainsi que toute information sur le développement de stratégies opérationnelles et de normes qui puissent permettre une meilleure gestion de la relation coût/efficacité. C'est pour cela que AGRI prendra spécialement en considération toutes les contributions référées aux races et aux normes capables de permettre une intensification durable des milieux (agroécosystèmes) à revenus moyens et bas dans le monde; qui comprennent la majeure partie des terres consacrées à l'élevage, à la production totale des aliments et l'agriculture provenant de l'élevage; et tout ce qui reste comme ressources génétiques des animaux domestiques.

Les opinions exprimées dans les articles publiés dans AGRI appartiennent seulement aux auteurs et donc ne représentent pas nécessairement l'opinion des instituts pour lesquels ils travaillent, la FAO ou les éditeurs.

L'opportunité ou non de publier un article dans AGRI sera jugée par les éditeurs et les réviseurs.

## Publication électronique

En plus de sa version imprimée, la version totale de AGRI se trouve disponible sur Internet, sur le site:

<<<http://www.fao.org/dad-is/>>>

## Types d'articles

Les articles suivants pourront être publiés sur AGRI:

### Articles de recherche

Seront prises en considération pour leur publication sur AGRI les études sur la caractérisation, la conservation et l'utilisation des ressources génétiques des animaux domestiques (AnGR) accompagnées d'une bonne description du milieu. On encourage les auteurs à envoyer des photographies de bonne qualité qui montrent les races en question dans leur milieu naturel de production.

### Révisions

Occasionnellement, des articles contenant une révision des agroécosystèmes, au niveau national, régional ou mondial, avec un ou plusieurs aspects se rapportant à la gestion des ressources génétiques animales, y comprises les mises à jour des différentes zones de AnGR, seront pris en considération.

### Articles spécifiques

Ponctuellement, des articles sur des thèmes spécifiques pourront être demandés pour la publication d'éditions spéciales.

### Autre matériel pour publication

Ceci comprend la révision de livres, nouvelles et notes de réunions importantes, cours de formation et principaux événements nationaux, régionaux et internationaux; ainsi que les conclusions et recommandations par rapport aux objectifs de ces principaux événements. Les auteurs sont priés d'envoyer ce genre de matériel aux éditeurs.

## Guide pour les auteurs

### Présentation du manuscrit

Les articles se présenteront en anglais, français ou espagnol, avec un résumé en anglais et sa traduction en français ou en espagnol; et seront envoyés à l'éditeur de AGRI, AGAP, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italie. L'autre possibilité est d'envoyer l'article par courrier électronique avec le document adjoint en version WinWord à <agri@fao.org>. Les photographies, en couleur ou en blanc et noir, seront toujours envoyées par courrier normal.

Les manuscrits se présenteront à double interligne et avec le numéro correspondant à chaque ligne sur la marge gauche. Toutes les pages seront numérotées, y comprises celles avec les références bibliographiques, les tableaux, etc. L'auteur recevra une lettre lui donnant bonne réception de son document.

Lorsqu'un article, après sa révision, sera accepté, on demandera à l'auteur d'envoyer la version finale révisée sur disquette (format 3 1/2") en Word 6.0 x Windows, ainsi qu'une copie sur papier.

### Préparation du manuscrit

Sur la première page du manuscrit on indiquera le titre de l'article en abrégé, le titre et noms des auteurs, des institutions, les adresses complètes (y compris code postal et numéro de téléphone); ainsi que tout autre moyen de contact tel que fax, e-mail, etc. avec l'auteur principal. Le titre abrégé ne devra pas dépasser les 45 caractères, plus les espaces nécessaires, et s'écrira sur la partie supérieure de la page 1 du manuscrit en majuscules. Le titre en entier du manuscrit sera écrit en majuscules et minuscules; il devra être aussi bref que possible, sans dépasser les 150 caractères (y compris les espaces nécessaires), et avec l'indication des noms des espèces. Les noms des auteurs, des institutions et les adresses seront en italique et en lettres majuscules et minuscules. On laissera un espace en blanc entre le titre et les noms des auteurs. Les adresses seront indiquées comme

des notes à pied de page pour chacun des auteurs après avoir laissé un espace en blanc après les noms. Chaque note de pied de page sera numérotée. On laissera deux espaces en blanc après les adresses.

### Titres

Les titres de chaque chapitre, par exemple Résumé, Introduction, etc. seront alignés à gauche. Laisser deux espaces en blanc entre les notes de pied de page avec les adresses et le Résumé, et entre le titre Résumé et le texte qui suit. Le résumé ne devra pas dépasser les 200 mots. Il s'agira d'un résumé objectif qui fasse une brève description des processus utilisés et des résultats obtenus, et non pas une simple présentation du travail réalisé avec une description générale des résultats. Laisser un espace en blanc entre la fin du texte du résumé et les mots-clés, qui seront écrits en italique ainsi que le titre Mots-clés. Les mots-clés seront au maximum six et il ne devra pas y avoir de "et" ou "&". Tous les titres principaux de chapitre (14 regular) et sous-chapitre (12 regular) seront en gras avec un espace en blanc avant et après. Le texte commencera sans retrait. Un titre à l'intérieur d'un sous-chapitre s'écrira en italique, suivi d'un point, avec le texte à continuation.

### Tableaux et figures

Les tableaux et les figures iront à la fin du texte en suivant l'ordre d'apparition dans le texte. Les photographies ne seront pas dévolues aux auteurs.

### Tableaux

Les tableaux, y compris les notes de pied de page, devront avoir un espace en blanc avant et après. Le numéro du tableau et le titre s'écriront sur la partie supérieure en italique (12) avec un point à la fin et un espace en blanc en dessous. Sur chaque colonne, titre d'en-tête ou sous-titre, seulement la première lettre du premier mot sera en majuscule. Les tableaux et leur titre seront alignés à gauche, ainsi que le texte. Les lignes verticales et

horizontales seront utilisées seulement si nécessaires. Ne pas utiliser les tabs ou la barre de séparation pour créer un tableau.

### *Figures*

Les figures, y compris les titres et les légendes, seront précédés et suivis de deux espaces en blanc. Le numéro de la figure et le titre s'écriront sur la partie supérieure en italique (12) avec un point à la fin. Sous la rubrique figure on trouvera les photographies, les graphiques, les cartes, les diagrammes, etc. Dans le cas des diagrammes, la matrice originale avec les données utilisées pour son élaboration devra être envoyée. On recommande l'utilisation de Word 6.0 ou Excel 5.0 pour la présentation des diagrammes.

### **Références**

Toute référence présente dans le texte devra apparaître sur la liste des références, et chaque référence de la liste aura été citée au moins une fois dans le texte. Les références iront en ordre alphabétique du nom de l'auteur, suivi de l'année. Exemple dans le cas d'une référence sur une revue:

Köhler-Rollefson, I., 1992; The camel breeds of India in social and historical perspective. *Animal Genetic Resources Information* 10, 53-64.

Lorsqu'il s'agit de plus d'un auteur:

Matos, C.A.P., D.L. Thomas, D. Gianola, R.J. Tempelman & L.D. Young, 1997; Genetic analysis of discrete reproductive traits in sheep using linear and nonnlinear models: 1. Estimation of genetic parameters 75, 76-87.

Dans le cas d'un livre ou d'une publication ad hoc, par exemple un rapport, une thèse, etc.:

Cockril, W.R., (Ed), 1994; *The Husbandry and Health of the Domestic Buffalo*. FAO, Rome, Italy, pp 993.

S'il s'agit d'un acte d'une réunion:

Hammond, K., 1996; FAO's programme for the management of farm animal genetic resources. In C. Devendra (Ed.) *Proceedings of IGA/FAO Round Table on the Global Management of Small Ruminant Genetic Resources*, Beijing, May 1996, FAO, Bangkok, Thailand, 4-13.

Lorsque l'information contenue dans l'article ait été obtenue ou dérive d'un site World Wide Web, il faudra mettre le texte entre guillemets; par exemple "tiré de la FAO. 1996" et indiquer dans les Références la forme standard URL:

FAO, 1996; Domestic Animal Diversity Information System <<http://www.fao.org/dad-is/>>, FAO, Rome



## Reglas y normas editoriales

El objetivo del Boletín de Información sobre Recursos Genéticos Animales (AGRI) es la divulgación de la información sobre una mejor gestión de los recursos genéticos animales de interés para la producción alimentaria y agrícola, siguiendo la Estrategia Mundial para la Gestión de los Recursos Genéticos de los Animales Domésticos. Todos los aspectos referidos a la caracterización, la conservación y el uso de estos recursos serán tomados en consideración, de acuerdo con la Convención sobre la Biodiversidad.

AGRI publicará información sobre genética, encuestas fenotípicas y económicas y descripciones comparativas, uso, desarrollo y conservación de los recursos genéticos animales, así como sobre el desarrollo de estrategias operacionales y normas que permitan una gestión más eficaz de la relación costo/eficacia. Por ello, AGRI prestará especial atención a las contribuciones referidas a razas y normas capaces de contribuir a la intensificación sostenible de los medios (agroecosistemas) con ingresos medio y bajos en el mundo, que comprenden casi la mayor parte de las tierras dedicadas a la producción ganadera; la producción total de alimentos y agricultura provenientes de la ganadería; y el resto de los recursos genéticos de animales domésticos.

Los puntos de vista expresados en los artículos publicados en AGRI son solamente las opiniones de los autores y, por tanto, no reflejan necesariamente la opinión de las instituciones para las cuales trabajan dichos autores, de la FAO o de los editores.

La oportunidad o no de publicar un artículo en AGRI será juzgada por los editores y revisores.

## Publicación electrónica

Además de su publicación impresa, la versión íntegra de AGRI se encuentra disponible electrónicamente sobre Internet, en el sitio: <<<http://www.fao.org/dad-is/>>>

## Tipos de artículos

Serán publicados en AGRI los siguientes tipos de artículos:

### Artículos sobre investigación

Se tomarán en consideración para su publicación en AGRI los estudios sobre la caracterización, conservación y uso de los recursos genéticos de los animales domésticos (AnGR) con una buena descripción del entorno. Se agradecerá el envío de fotografías de calidad que presenten a las razas en cuestión en su ambiente natural de producción.

### Artículos de revisión

Se podrán tener en consideración ocasionalmente aquellos artículos que presenten una revisión de los agroecosistemas, a nivel nacional, regional o mundial, con el desarrollo de uno o más aspectos referidos a la gestión de los recursos genéticos animales, incluidas las revisiones sobre el estado actual de las distintas áreas de AnGR.

### Artículos específicos

Se solicitarán puntualmente artículos sobre temas específicos para ediciones especiales.

### Otro material para publicación

Incluye la revisión de libros, noticias y notas referidas a reuniones importantes, cursos de formación y principales eventos nacionales, regionales e internacionales, así como conclusiones y recomendaciones relacionadas con los objetivos de estos principales eventos. Se invita a los lectores a enviar este tipo de material a los editores.

## Guía para los autores

### Presentación del manuscrito

Los artículos se presentarán en inglés, francés o español, junto con un resumen en inglés y su traducción en francés o español, y se enviarán al editor de AGRI, AGAP, FAO, Viale delle Terme di Caracalla, 00100 Roma, Italia. Otra posibilidad es enviar el artículo por correo electrónico adjuntando el documento en versión WinWord a <agri@fao.org>. Las fotografías, a color o en blanco y negro, se enviarán siempre por correo normal.

Los manuscritos se presentarán con doble espacio y con el número correspondiente a cada línea en el margen izquierdo. Todas las páginas serán numeradas, incluidas las de las referencias bibliográficas, cuadros, etc. El autor recibirá una notificación sobre la recepción de su documento.

En el caso de aceptación de un artículo después de su revisión, se solicitará al autor una versión final de su artículo revisado en disquete (formato 3 1/2") en Word 6.0 x Windows, así como una copia impresa del mismo.

### Preparación del manuscrito

En la primera página del manuscrito se indicará el título abreviado del artículo, títulos y nombres de los autores, instituciones, direcciones completas (incluido código postal y número de teléfono); así como otros medios de contacto tales como fax, e-mail, etc., del autor principal. El título abreviado no deberá sobrepasar los 45 caracteres más los espacios correspondientes, y aparecerá en la parte superior de la página 1 del manuscrito en mayúsculas. El título entero del manuscrito viene escrito en mayúsculas y minúsculas. Dicho título debe ser lo más breve posible y no sobrepasar los 150 caracteres (incluidos los espacios necesarios), con los nombres de las especies, si necesario. Los nombres de los autores, instituciones y direcciones se escribirán en cursiva y en letras mayúsculas y minúsculas. Se dejará una línea en blanco

entre el título y los nombres de los autores. Las direcciones se escribirán como notas de pie de página de cada autor después de dejar una línea en blanco entre los nombres y éstas. Cada nota de pie de página con la dirección vendrá indicada numéricamente. Se dejarán dos líneas en blanco después de las direcciones.

### Títulos

Los títulos de cada sección, por ejemplo Resumen, Introducción, etc., vienen alineados a la izquierda. Dejar dos líneas en blanco entre las notas de pie de página con las direcciones y el Resumen y entre el título Resumen y el texto que sigue. El resumen no deberá exceder de 200 palabras. Deberá ser un resumen objetivo que describa brevemente los procesos y logros obtenidos, y no una presentación de cómo se ha llevado a cabo el estudio y una descripción genérica de los resultados. Dejar una línea en blanco entre el final del texto del resumen y las palabras clave, que se escribirán en cursiva así como el título Palabras clave. No deberán ser más de seis y no deberán contener "y" o "&". Todos los títulos principales de capítulo (14 regular) y subcapítulo (12 regular) serán en negrita e irán precedidos y seguidos de una línea en blanco. El texto correspondiente empezará sin sangrado. Un título dentro de un subcapítulo se escribirá en cursiva e ira seguido de un punto con a continuación el texto correspondiente.

### Cuadros y figuras

Los cuadros y las figuras se incluirán al final del texto siguiendo el orden de cita dentro del mismo. Las fotografías no serán devueltas a sus autores.

### Cuadros

Los cuadros, incluidas las notas de pie de página, deberán ir precedidos y seguidos por dos líneas en blanco. El número del cuadro y su título se escribirán en la parte superior en cursiva (12) con un punto al final y seguido

de una línea en blanco. En cada columna o título de encabezamiento o subtítulo, sólo la primera letra de la primera palabra irá en mayúscula. Los cuadros irán numerados de forma consecutiva con números árabes. Los cuadros y sus títulos se alinearán a la izquierda, así como el texto. Se utilizarán líneas horizontales o verticales sólo cuando sea necesario. No utilizar tabuladores o la barra espaciadora para crear un cuadro.

### *Figuras*

Las figuras, incluidos los títulos y leyendas, irán precedidas y seguidas de dos líneas en blanco. El número de la figura y el título se escribirán en la parte superior en cursiva (12) con un punto al final. La palabra figura incluye las fotografías, los gráficos, los mapas, los diagramas, etc. En el caso del diagrama se enviará la matriz original con los datos utilizados para crearlo. Se recomienda encarecidamente la utilización de Word 6.0 o Excel 5.0 para la presentación de los diagramas.

### **Referencias**

Toda referencia presente en el texto deberá aparecer en la lista de referencias y, de la misma manera, cada referencia de la lista deberá haber sido citada por lo menos una vez en el texto. Las referencias deben ir en orden alfabético del apellido del autor, seguido por el año.

Ejemplo en el caso de una referencia de una revista:

Köhler-Rollefson, I., 1992; The camel breeds of India in social and historical perspective. *Animal Genetic Resources Information* 10, 53-64.

Cuando se trata de más de un autor:

Matos, C.A.P., D.L. Thomas, D. Gianola, R.J. Tempelman & L.D. Young, 1997; Genetic analysis of discrete reproductive traits in sheep using linear and nonnlinear models: 1. Estimation of genetic parameters 75, 76-87.

En el caso de un libro o de una publicación ad hoc, por ejemplo informes, tesis, etc.:

Cockril, W.R., (Ed), 1994; *The Husbandry and Health of the Domestic Buffalo*. FAO, Rome, Italy, pp 993.

Cuando se trate de un artículo dentro de las actas de una reunión:

Hammond, K., 1996; FAO's programme for the management of farm animal genetic resources. In C. Devendra (Ed.) *Proceedings of IGA/FAO Round Table on the Global Management of Small Ruminant Genetic Resources*, Beijing, May 1996, FAO, Bangkok, Thailand, 4-13.

Cuando la información contenida en el artículo haya sido obtenida o derive de un sitio World Wide Web, poner el texto entre comillas; por ejemplo "sacado de la FAO. 1996" e indicar en las Referencias la forma estándar URL:

FAO, 1996; *Domestic Animal Diversity Information System* <<http://www.fao.org/dad-is/>>, FAO, Rome

## Corrigendum

AGRI 25, J.E.O. Rege, page 2: figure 1 to be corrected to:

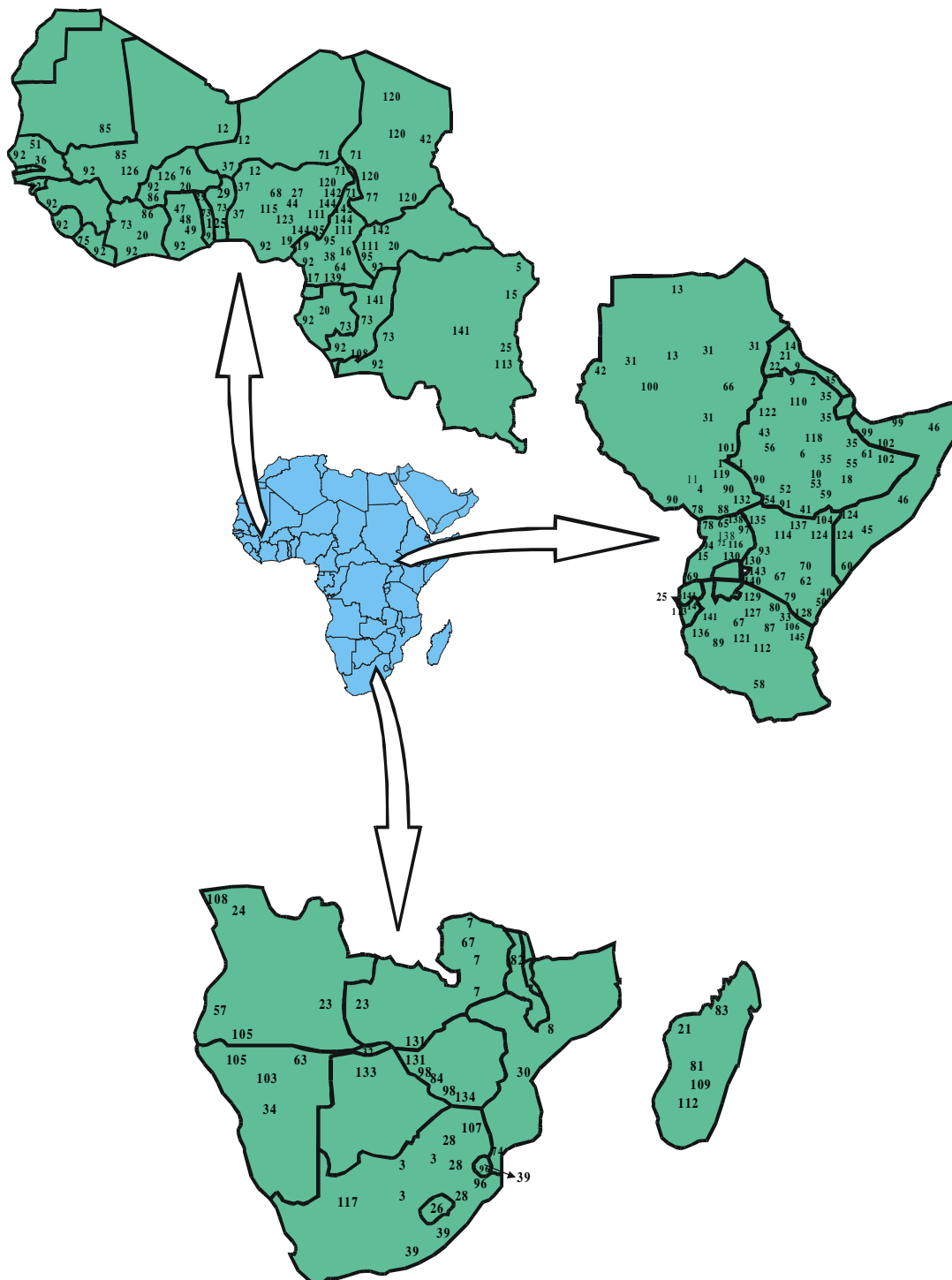


Figure 1. Distribution of cattle breeds in some African countries.

AGRI 25, J.S.F. Barker, page 37: table 3 to be corrected to:

*Table 3. Correlation coefficients among genetic distances estimated from data on 21 microsatellite loci or 25 protein coding loci.*

	Microsatellites			Protein Coding		
	Nei D	D <sub>A</sub>	Delta mu	Reynolds	Nei D	D <sub>A</sub>
Reynolds	.921	.911	.748	.831	.773	.798
Nei D		.991	.890	.754	.774	.772
D <sub>A</sub>			.897	.748	.771	.783
Delta mu				.738	.797	.772
Reynolds					.929	.965
Nei D						.937

All significant,  $P < 0.001$

AGRI 25, J.S.F. Barker, page 41, column 1, lines 35 and 40: F<sub>ST</sub> to be corrected to: F<sub>ST</sub>.  
page 41, column 1, line 46: D<sub>A</sub> to be corrected to D<sub>A</sub>

.....

AGRI 25, D.L. Simon, page 78, column 2: sequence of the years must be corrected to:

- 1979 Animal breeding scientists propose a definition of the status of endangerment of breeds and criteria for conservation of endangered breeds (Deutsche Gesellschaft für Züchtungskunde, 1979).
  - 1979 Foundation of the Nordic Working Party on Animal Gene Banks for the Scandinavian countries (Maijala *et al.*, 1992).
  - 1980 Set-up of the Working Group on Animal Genetic Resources (EAAP-WGAGR) by the Commission on Animal Genetics of the European Association for Animal Production.
  - 1983 Survey by the EAAP-WGAGR on breeds and country populations in Europe (Maijala *et al.*, 1984).
  - 1987 Set-up of the EAAP Animal Genetic Data Bank (EAAP-AGDB) at the Institute of Animal Breeding and Genetics, Hanover (Simon, 1990).
  - 1992 Commission of European Communities 'Workshop and Training Course on data collection, conservation and use of animal genetic resources' in Hanover.
  - 1993 EAAP-publication No. 66 'Genetic diversity of European livestock breeds', with status of endangerment and formation of groups of similar breeds.
  - 1994 Nomination of National Focal Points in FAO Member-Countries of Europe as national co-ordinators for conservation of FAGR.
  - 1996 INTERNET presentation of information of European breeds by the EAAP-Animal Genetic Data Bank, Hanover, and INTERNET-presentation of information of the FAO Domestic Animal Information System DAD-IS, Rome.
- .....