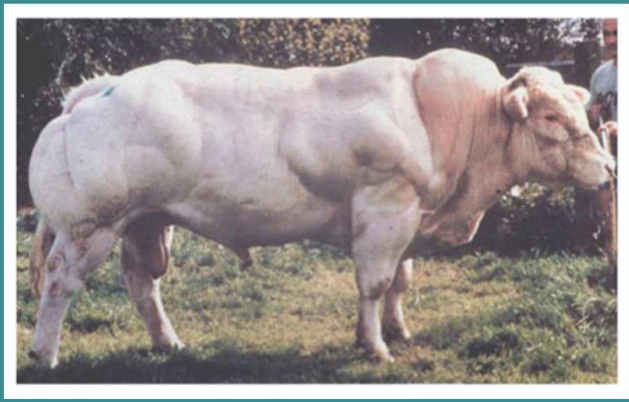
Université de Liège

Faculté de médecine étérinaire

Animal breeding and animal health

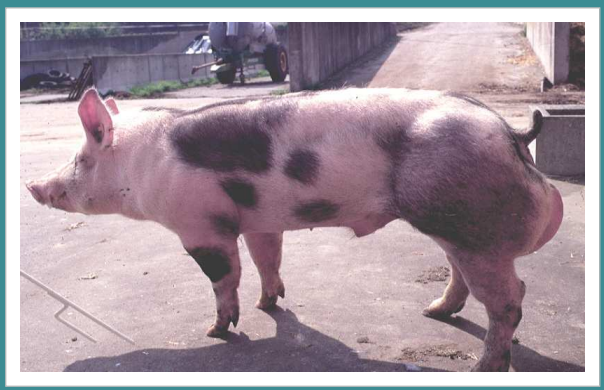


Since 1978, the research unit performs in Belgium the national genetic evaluation of beef cattle mainly the Belgian Blue Breed (BBB) using linear models (BLUP and Animal Model).

Other research programs, in cooperation with the research unit of animal pathology, involve the production of the Piétrain pig breed, mainly the stress negative line carrying genes underlying resistance to neonatal and post-weaning diarrhea and also to the influenza viruses. These animals are also resistant to thermal stress and are used as terminal sire line in hot regions in order to improve the amounts of muscle.

The unit also participated actively in the development and promotion of the Belgian texel sheep presenting muscle hypertrophy. The breed has been studied by the Unit of animal genomics unraveling the involvement of Myostatin locus as in the BBB.

Current research about the benefits of the use of hyper-muscled Belgian breeds of three species (cattle, pig and sheep) for crossbreeding with local breeds gave favorable results: improvement of the carcass conformation with a significant increase of the amount of muscle and significant decrease of the amount of fat and bone. In all species, the delivery was without special assistance. Since the 80's, the unit studies the local poultry breeds and particularly, the Ardennaise breed. This breed is tested in Belgium and in hot regions where it is used to increase the amounts of eggs and meat on pilot farms.



The pilot farm is a new multidisciplinary concept promoted in order to reduce poverty in a sustainable agricultural approach. It is studied and tested in Congo (RDC), in Guinea and Senegal.

Department of Animal Production, Faculty of Veterinary Medicine
University of Liege

Livestock contribute 40% of the global value of agricultural output and support the livelihoods and food security of almost a billion people. At the global level, livestock contribute 15% of total food energy and 25% of dietary protein.

Animal genetic resources are crucial to sustainable development of animal production. However, a gradual and relentless depleting of available breeds is now rife at the global scale. The occurrence of epidemics, natural disasters and conflicts also threaten these resources either through direct extinction or indirect effects such as the reduction in suitable habitat.

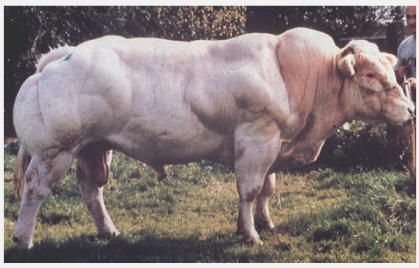
The efficient management of animal genetic resources in general, requires first the phenotypic identification of the concerned breeds. But, it also requires their statistics such as population sizes, geographic distributions (habitats) and, where financial means are available, genetic diversity. Finally, without taking the socio-economic context into account, no sustainable development program can be conceived.

The importance of the genetic resources both at the ecological and economical levels does not need emphasising. The seriousness of the depletion of these resources across the world, requires that an action plan be in place to preserve diversity.

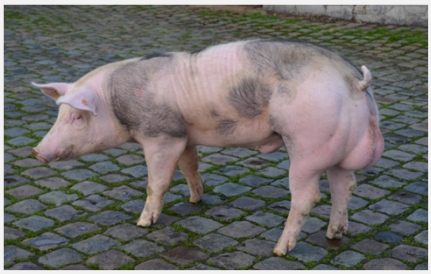
Our research unit has been working in the recent years on the development of modern farming using traditional breeds. Seven animal species (cattle, sheep, goats, pigs, poultry, camels and horses) are studied in a 34 countries on four continents (Africa, Europe, America and Asia). The purpose of this brochure is to present this work.

Belgian breeds

Belgian Blue Cattle



Pietrain pig




Belgian Texel Sheep



Ardennaise Poultry breed


Ardennes Horse

Growth and carcass performances of Belgian Blue x Nelore and Braford cattle in Bahia State Brazil

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1. Introduction

36 Belgian Blue x Nelore cross (BBB x Nelore) were compared to 54 Braford on the AgriBahia Fazenda Lagoa do Morro (GES), Bahia State, Brazil.

Nelore cows were inseminated with 2 Belgian Blue Bulls belonging to the Company: Belgian Blue Group. Braford animals were already kept on the same farm. Calving was normal without assistance for all cows.

During the last three months of fattening, animals got a complementation base on rice by products (1% of live weight)

2. Results - Growth

The average daily gain was 938.5 g/d (926.0 g/d for the BBB x Nelore, 948.7 g/d for the Braford) before 300 days and lower afterward due to a strong dry period reducing the total daily gain (on average 740.9 g from birth to slaughter).
10 BBB x Nelore steers and 10 Braford steers were slaughtered at an average of 25 months (BBBxNelore 755 days, Braford 750 days)

3. Results - Slaughter and Dissection

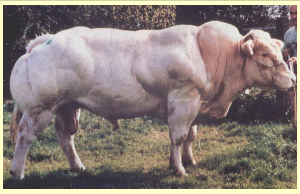
Average live weight, carcass weight and killing out% were respectively 553.5 Kg, 286.6 Kg and 51.8% for the Braford. Corresponding values were 539.7 Kg, 292.0 Kg and 54.1% for the BBB x Nelore cross having, on average, lower live weight (-13.8 Kg), heavier carcasses (+5.4 Kg) and a higher value of killing out% (+2.3%).

The 7th right rib from each of the 20 steers, taken one day after slaughter, were dissected. Measured values of fat, meat and bone and also the weight of Longissimus Dorsi, Trapezius and Latissimus Dorsi revealed that
BBB x Nelore bulls had 109.7 g less fat (-14.22%), 264 g less bone (-21.94%) and 386 g more meat (+19.15%) in the 7th rib in comparison to Braford bulls.
Corresponding values computed on the total weight of the 7th rib were -2.54%, -6.90% and +9.44%.

4. Conclusion

Belgian Blue x Zebu Nelore crosses were born without assistance, can survive in very dry conditions, have higher dressing out percentages than Braford with carcasses characterized by less fat, less bone and more meat. Belgian Blue is thus suggested to increase meat production in Brazil.

Belgian Blue **Zebu Nelore**



**Aladin BN Das Reunidas,
BBB x Nelore, 39 months: 1240 Kg**

Typical Braford 7th rib

Typical Belgian Blue x Nelore 7th rib

BBB x Nelore: 7th rib *+386 g of muscle (+19.15%), 264 g less bone (-21.9%) and 109.7 g less fat (-14.2%), Longissimus dorsi +47.5 g (+22%)*

Belgian Blue x Nelore 240 Kg at 7 months

Belgian Blue x Nelore 540 Kg at 25 months

Programme Interreg III

Conditions de publication et de mise en forme des valeurs génétiques

Programme Interreg III Belgique – France:

Projet **CTBBH**: Croisement Terminal Blanc-Bleu Belge sur race Holstein

Objectifs

Evaluation génétique transfrontalière de taureaux BB en croisement sur vaches Holstein

Propositions de conditions de publication tenant compte de

- La situation dans chacun des pays
- Des contraintes propres au programme

Seuil de précision des index

En race à viande en France et Belgique

- CD minimum=0.70
- h2 similaires pour les différents caractères d'intérêt (de 0,20 à 0,40)

=> Nombre de descendants requis:+/- 70

Proposition pour le CTBBH

Contraintes

- +/-70 descendants / taureau selon les capacités de testage
- mais h^2 = 0.10

=> CD minimum = 0.50

Base de référence des index

France: base mobile, moyenne des taureaux évalués sur les 5 dernières années avec minimum de 50 taureaux

Belgique: la moyenne de la population estimée par le calcul BLUP

Propositions pour le CTBBH: base mobile

- dans un 1er temps,moyenne de tous les taureaux évalués
- Ensuite les 50 derniers

Expression des index

Dans les 2 pays,standardisation avec moyenne 100 et 10 points = 1 σ_a

- Mais interprétation différente du poids à la naissance et du mode de naissance

  En France: index «facilité de naissance» > 100 = favorable

  En Belgique: index sur le poid à la naissance et mode de naissance >100 = vêlages difficiles

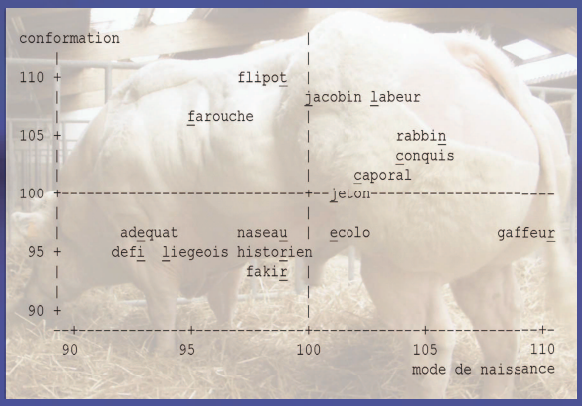
Proposition pour le CTBBH:

- mode d'expression français

Statistique descriptive des caracteres enregistres

Caractères	Effectif	Moyenne	Ec. St.
Poids naissance (kg)	1 522	49,6	7,1
Césariennes rang	1 580	4,11	
Prix de vente 2006/veau (€)	353	339,60	84,90
vêlage ≥ 1 (%)			

Indexation



(CTBBH)
C. Michaux, L. Journaux, C. Bertozzi, E. Cauchy, A. Fauvarque, F. Ménissier, P. Lebailly, H. Brismée

Programme réalisé avec le soutien du FEDER, de la région wallonne et de la Province de Hainaut

avec le soutien du FEDER

Critères d'appréciation des reproducteurs en systèmes d'élevage traditionnel du zébu Azawak dans les zones d'Abalak, Filingué et Niamey (Niger)

Siddo S.[1], Moula N. [1,2], Marichatou H.[3], Leroy P.[1,2] & Antoine-Moussiaux N.[1,2]

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Contexte et objectif

Pour relever le défi de la satisfaction des besoins mondiaux en produits d'origine animale, il s'avère nécessaire de poursuivre les efforts d'intensification des productions en accord avec les contextes agro-écologiques et socio-économiques. Une telle intensification nécessitera sur le long terme une amélioration génétique des races locales. Pour assurer l'adéquation de ce progrès génétique avec le contexte d'élevage et l'adhésion des éleveurs aux schémas proposés, la connaissance des critères de sélection tels qu'employés par les éleveurs est primordiale. L'objectif de cette étude est de caractériser les critères d'appréciation, pour la sélection ou la réforme, des reproducteurs Azawak (Figure 1) en systèmes d'élevage traditionnel au Niger.

Enquête

- ✓ 120 éleveurs d'Azawak non-améliorés
- ✓ 3 contextes d'élevage différents
- ✓ entretiens semi-structurés
- ✓ questions fermées et ouvertes

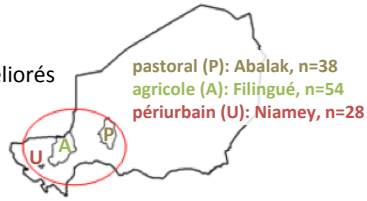

Figure 1: Zébus Azawak améliorés, mâle et femelle

Résultats

Les éleveurs interrogés élèvent la race Azawak pour sa production laitière, sa valeur socioculturelle, l'esthétique de la robe, la facilité d'engraissement et sa docilité pour la traction (**Tableau I**). Les taux de citation diffèrent entre les zones de production.

Les motifs mentionnés par les 34,5% d'éleveurs affirmant ne pas apprécier le zébu Azawak amélioré font référence à son inadaptation à l'élevage mobile à faible niveau d'intrants (**Figure 2**).

Tableau I: Motivations pour l'élevage du bovin Azawak amélioré (taux de citation en %)

	Zone		
	Agricole	Pastorale	Périurbaine
n	54	38	28
Motivation			
Race (culturel)	68,1	25,5	6,4
Revenu	58,6	34,5	6,9
Lait	51,9	28,6	19,5
Embouche	55,6	22,2	22,2
Docilité	55,2	31,0	13,8
Précocité	56,5	43,5	0,0

n: nombre d'éleveurs par zone

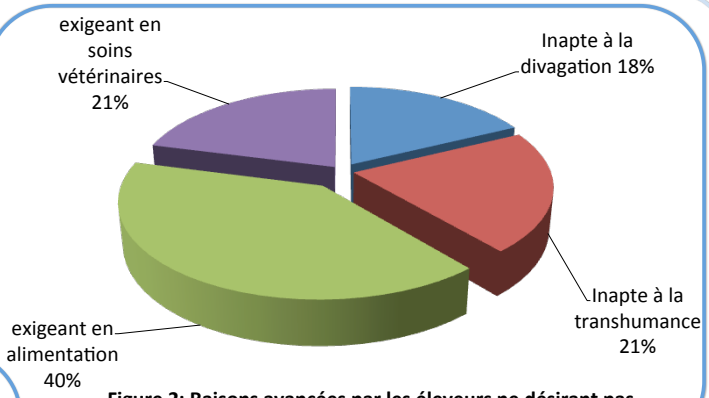

Figure 2: Raisons avancées par les éleveurs ne désirant pas élever le zébu Azawak amélioré (%)

Les critères majeurs du choix du géniteur dans les 3 systèmes d'élevage sont la longueur de la queue (60,0%), la grosseur du fourreau (58,2%), la performance laitière des descendants (55,0%), ainsi que leur bonne conformation (48,3%) et leur docilité (46,7%). La réforme des mâles est dictée par le comportement d'errance (67,7%), l'indocilité (51,9%) et la mauvaise conformation des descendants (42,6%).

Discussion

Dans les élevages traditionnels du zébu Azawak au Niger, l'appréciation d'un reproducteur n'est pas liée seulement à sa contribution à la subsistance du ménage par la production laitière mais aussi aux valeurs sociales et culturelles, aboutissant notamment à des critères esthétiques et comportementaux. La multifonctionnalité et l'environnement risqué de l'élevage induisent également une relativisation de l'importance de la production laitière ou bouchère dans les objectifs d'amélioration. La connaissance de ces objectifs et des critères d'appréciation qui en résultent est cruciale pour la diffusion du zébu Azawak amélioré, voire la réorientation de sa sélection en station.

Typologie des élevages laitiers et ressources génétiques bovines autour de Bamako (Mali)

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Contexte et objectif

Au Mali, l'accroissement de la production laitière est une priorité des politiques d'élevage. Un plan national d'amélioration du cheptel bovin y a été initié, favorisant les croisements avec des races exotiques, principalement en provenance d'Europe. Le pays dispose ainsi d'un effectif important de bovins métis. Ceux-ci sont surtout élevés dans les zones périurbaines de Bamako, Ségou, Sikasso et Mopti. Cette étude vise à un état des lieux des systèmes de production laitiers dans la zone périurbaine de Bamako et des ressources génétiques bovines qui y sont exploitées.

Enquête

- ✓ 53 producteurs répartis sur 6 sites autour de Bamako
- ✓ 2 périodes: mars-avril et octobre-novembre 2012
- ✓ Entretiens semi-structurés
- ✓ Questions fermées et ouvertes
- ✓ Thèmes
  - aspects socio-économiques du ménage
  - aspects zootechniques de l'exploitation
  - animaux et races dans l'exploitation
- ✓ Analyse statistique à plusieurs variables, logiciel SAS
  - analyse en composantes principales (ACP),
  - classification ascendante hiérarchique (CAH)

Figure 1: carte du Mali et positionnement des sites d'enquête autour de Bamako

Résultats

Les exploitations enquêtées sont globalement de petite taille, avec 80% de l'échantillon élevant moins de 34 vaches (**Tableau 1**). L'alimentation représente près de 85% des charges variables totales. L'analyse statistique (ACP, CAH) a permis de distinguer cinq groupes d'élevages (**Tableau 2**). Cette classification fait apparaître un continuum d'intensification. Le groupe B présente une marge brute négative, des troupeaux plus grands et de fortes dépenses en aliment bétail concentré.

	Effectif bovin par foyer	Production lait (litres/vache)	SAU par foyer
N	1428	429	21
Moyenne	31	1091	8,32
CV (%)	44,95	87,31	69,23
Min	5	180	0
Max	208	3800	25

Tableau 1: caractéristiques des exploitations enquêtées

	Groupes				
Variables	A	B	C	D	E
Nombre de foyers	23	9	5	11	5
Effectif bovin	14	62	23	19	20
Superficie fourrage (ha)	0,26	9,12	2,80	2,90	6,60
Achat concentré (Fcfa par bovin)	311 491	7 582 475	697 580	831 181	2 661 060
Production de lait (litres par an)	2 650	20 126	9 010	5 988	17 500
Vente du lait (Fcfa)	1 060 000	8 050 750	3 604 240	2 395 272	7 000 000
MB (Fcfa par bovin)	685 247	-587 007	2 419 220	1 298 709	3 479 900
Pratique de l'IA	0	3,75	0	1	0,40

Tableau 2: Caractéristiques structurelles et performances des élevages selon le groupe, tel que déterminé par CAH

Trente profils génétiques sont répertoriés, incluant des races locales ou exotiques et différents niveaux de croisement (**Tableau 3**). Parmi les races exotiques, la Holstein est la plus utilisée en croisement et la seule en pur. Représentant près d'un tiers du cheptel exploité, les croisés Holstein constituent le second plus grand groupe génétique. Des croisements avec la Montbeliarde, la Normande et la Limousine sont également exploités.

Profils génétiques	Effectif	%
Races pures		
Zébu Peul	654	45,8
Zébu Maure	131	9,2
Zébu Azawak	18	1,3
Holstein	43	3,0
Kouri	1	0,1
Mere	7	0,5
Croisés		
Holstein	436	30,5
Montbéliardes	94	6,6
Normandes	10	0,7
Limousins	4	0,3
Azawak, Maure	2	0,1
Inconnu	29	2,0
Total	**1428**	**100**

Tableau 3: Profils génétiques dans l'ensemble des exploitations enquêtées

Discussion

Les élevages bovins autour de Bamako ne peuvent être considérés comme une entité homogène. Les variables les distinguant font référence au degré d'intensification et de dotation de l'éleveur: cheptel et types génétiques présents, main d'œuvre, superficies agricoles réservées aux cultures fourragères. Néanmoins, ces exploitations restent généralement basées sur une alimentation sur parcours. Les pratiques de complémention sont quant à elles très variables, usant de sous-produits agricoles et agro-industriels.

Le nombre élevé de profils génétiques révèle l'absence ou la non-maîtrise de schémas de croisement appropriés afin d'aboutir à une race synthétique performante et adaptée aux conditions locales. En l'absence de gestion des races locales, dans le but d'une conservation stricte ou d'une sélection génétique, l'usage répandu des croisements avec du bétail exotique représente une menace pour la diversité des ressources génétiques animales et est un facteur de non-durabilité de l'élevage péri-urbain au Mali. Si l'usage du croisement améliorateur n'est pas à proscrire, il est urgent d'élargir le spectre des politiques nationales d'amélioration génétique, afin d'y intégrer le souci de durabilité, menant à une meilleure gestion des races locales, garantes d'un progrès en adéquation avec la diversité des contextes agro-climatiques et socio-économiques.

Reproductive, survival and growth traits of the crossbreeding Belgian Texel x Moroccan local breeds of sheep

M. El Fadili[1] & P.L. Leroy[2]

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[2] Department of Genetics, Faculty of Veterinary Medicine, University of Liege, Belgium

Introduction

Local Moroccan breeds are characterized by their low growth rate, poor conformation and had a tendency to deposit more fat under intensive management conditions. In terminal crossing the utilization of improved meat sires which promotes rapid lamb growth, delayed fat development and improved carcass conformation can enhance quantitative and qualitative meat sheep production and meet the preference of consumers. The Belgian Texel breed which is known for its ability to produce higher meat quality can be considered in crossbreeding to improve sheep meat quality in Morocco.

Animals

An experiment was carried by INRA Morocco in order to evaluate the performances of Belgian Texel (BT) rams and their progeny when mated to Moroccan local breed ewes. Three BT rams were mated to Timahdite (T=30) and D'man x Timahdite (DT=30) ewes and compared to purebred ewes D'man (D=22) and (T=30) for ewe and lamb pre-weaning and fattening traits.

Results

Traits	D'man	Timahdite	Texel x T	Texel x DT
Fertility (%)	77^{a}	94^{b}	92^{b}	91^{b}
Litter size at weaning (lambs)	2.22^{a}	1.11^{b}	1.19^{b}	1.74^{c}
Productivity (kg/ewe)	**17.12^{a}**	**20.78^{a}**	**24.67^{b}**	**$27,41^{c}$**
Survival at birth (%)	87^{a}	98^{b}	96^{b}	91^{ba}
Survival to 90 days (%)	65^{a}	89b	88^{b}	85^{b}
Birth weight (kg)	2.89^{a}	3.14^{a}	3.60^{b}	3.45^{b}
ADG 10-30 (g/day)	131^{a}	144^{a}	165^{b}	183^{b}
ADG 30-90 (g/day)	142^{a}	149^{a}	173^{b}	187^{b}
Weaning weight (kg)	15.21^{a}	16.2^{a}	19.45^{b}	19.27^{b}
Fattening daily gain (g/day)	207	211	226	225
Conversion index	6.39^{a}	5.14^{b}	4.91^{b}	5.22^{b}

Conclusion

Ewes mated to Belgian Texel rams showed higher fertility (91%) and productivity at weaning (27.41kg or +7 Kg). Lambs sired by the BT rams had survival rate at birth (93%), and superior weaning weight (+3 kg), ADG10-30 (+42g/d) and ADG30-90 (+25 g/d). Furthermore crossed lambs had higher fattening ADG (225 g/d), less DM intake (1.06 kg) and better conversion feed rate (5.20) when compared to purebred lambs D and T. These results indicate that Belgian Texel rams and their progeny have well performed under Moroccan management conditions.

Results of crossbreeding between Belgian Texel and Moroccan local breeds of sheep. Carcass characteristics and meat composition.

M. El Fadili[1], P.L. Leroy[2].

[1] Department of Animal Production. National Institute of Agronomic Research. Morocco;
[2] Department of Genetics. Faculty of Veterinary Medicine. University of Liege. Belgium.

Introduction

Local Moroccan breeds are characterized by their poor conformation and had a tendency to deposit more fat under intensive management conditions. In terminal crossing the utilization of improved meat sires can enhance quantitative and qualitative meat sheep production and meet the preference of consumers. The Belgian Texel breed which is known for its ability to produce higher meat quality can be considered in crossbreeding to improve sheep meat quality in Morocco.

Animals

An experiment was carried in order to evaluate the performances of Belgian Texel (BT) rams and their progeny when mated to Moroccan local ewes. 50 lambs sired by BT rams(30), Timahdite (T=10) and D'man (D=10) were slaughtered and compared for carcass characteristics using the GLM-SAS procedure. Meat composition was obtained for each genotype using a half-carcass complete dissection of one male lamb.

Results

Carcass characteristics	D'man	Timahdite	Texel x T	Texel x DT
Number	10	10	15	15
Slaughter age (day)	164 ^{a}	170 ^{a}	159 ^{b}	161 ^{b}
Slaughter weight (kg)	29.62	30.11	31.48	31.67
Carcass weight (kg)	14.99	15.29	16.00	16.41
Dressing percentage (%)	50.69	51.10	51.55	52.69
Internal fat deposit (g)	640	496 ^{b}	335 ^{c}	408 ^{b}
Back fat (mm)	2.93	2.62	4.18	3.83
Carcass length (cm)	65.37 ^{a}	64.47 ^{a}	58.96 ^{b}	59.55 ^{b}
Carcass wide (cm)	17.62 ^{a}	17.25 ^{a}	19.21 ^{b}	19.57 ^{b}
Leg length (cm)	31.10 ^{a}	30.50 ^{a}	26.63 ^{b}	26.55 ^{b}
Conformation score (pts)	2.78 ^{a}	3.01 ^{a}	4.39 ^{b}	4.49 ^{b}
Compactness of carcass (%)	22.8 ^{a}	23.71 ^{a}	26.84 ^{b}	27.61 ^{b}

Conclusion

Crossbred lambs sired by BT rams were youngest (-7 days) and heavier (+1.7 kg) at slaughtering and have a better dressing percentage (+1.2%), when compared to T and D purebreds lambs. They also deposit less mesenteric fat (-197 g) and their carcasses were more compact (+4%) and well conformed (+1.5 points). The BT crossbred carcasses were also shorter (-6 cm) and larger (+2cm).

Left half carcass meat composition	D	T	TBxT	TBx T
Weight (kg)	15.76	16.2	16.4	16.1
Muscle (%)	57.67	60.7	64.9	62.4
Fat (%)	11.16	8.51	7.88	7.62
Bone (%)	20.70	22.3	19.03	20.10

The BT half-carcass composition showed more muscle, less fat and bone, indicating that progeny of BT sire have well performed under Moroccan management conditions and Thus BT breed could be considered to improve sheep meat quality in Morocco especially by its utilization in terminal crossing.

Evaluation of West African Dwarf (WAD) sheep and F1 crossed West African Long Legged (WALL) rams with WAD ewes in Benin: Growth and Survival traits

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Introduction

The crossbreeding of West African Long Legged (WALL) with West African Dwarf (WAD) sheep was practised in West Africa for boosting meat production [1,2,3,6]. Indeed, the survivability of superior animals is an important economic trait that needs to be taken into account [5]. There are, however, no documented results on the performance of crossbred sheep in Benin. The Tropical Veterinary Institute (University of Liege, Belgium) and the "Ecole Inter-Etats des Sciences et Médecine Vétérinaires de Dakar (West Africa)" had initiated a research program on F1 (WALL ram x WAD ewe) as an intermediate breed to satisfy the requirements of Benin (West Africa) breeders that wish to have a sheep with satisfactory growth rate. The purpose of this study was to compare growth and survival traits of WAD purebred sheep *versus* F1 (WAD x WALL) sheep and to quantify the effects of some environmental factors.

Material and methods

Management and data collected

Animals were raised on smallholders and research farm, in the subhumid region in south of Benin. They were not genetically linked and not subjected to selection. There is no data on the trypanosomosis risk level of production environment. Mature WALL rams were purchased from Gao in Mali (West Africa). Flocks management was typical (feeding, drenching and spraying, vaccination, weaning at 90 days of age). Additional systematic quarterly chemoprophylaxis (isometamidium chloride, *i.e.* samorin®) was provided for F1 (WAD x WALL) sheep. Feto-pelvic incompatibility was avoided crossing WALL rams with ewes from 2nd to 4th parity. F1 (WALL x WAD) male were castrated at weaning. Both F1 (WALL x WAD) male and female lambs were slaughtered at 12 months age.

Growth traits included birth weight (kg), BW; 3-month weight, W3; 6-month weight, W6; 9-month weight, W9; 12-month weight, W12. Averages daily gain (ADG, g/d) were computed using BW and W3 (ADG1), W3 and W6 (ADG2), W6 and W9, (ADG3), W9 and W12 (ADG4). Survival traits recorded were, date of birth, date of death, censored or uncensored. Factors of variation were related to the breed, flock, sex of lambs, type of birth, parity of ewe, season and year of birth.

Statistical analysis

Growth data analyses were performed with the general linear model procedure (*proc* GLM) of SAS® [4]. The Student's *t* – test, was used to test a significant difference between mean at 5%. Final fixed effects fitted were sex (male or female), type of birth (single or twins), the parity of ewe (1, 2, 3 and 4), and season of birth (S1, major rainy season; S2, short dry season; S3, short rainy season or S4, major dry season). The Survival traits analysis used the survival function of Kaplan-Meier (distribution of survival time), and the Cox Proportional Hazards Regression (investigation of fixed factors effects).

Results

F1 (WALL x WAD) lambs expressed growth performance better than WAD lambs (P<0.05, Figure 1). For WAD sheep, all main effects fitted were significant (P<0.05) for all growth traits. Significant effects of season on BW, ewe parity on BW, W3, W12 and ADG3, type of birth on BW, W3, W12, ADG1 and ADG3, sex of lamb on BW to 12W and ADG4 were recorded for F1 (WALL x WAD) sheep. The survival function for WAD and F1 (WAD x WAL) lambs, was similar (Cox test, p>0.05, Figure 2). year of birth and parity of ewe, are significantly (p<0.05) related to survival in WAD (Figure 3) and F1 (WAD x WAL) (Figure 4) lambs respectively

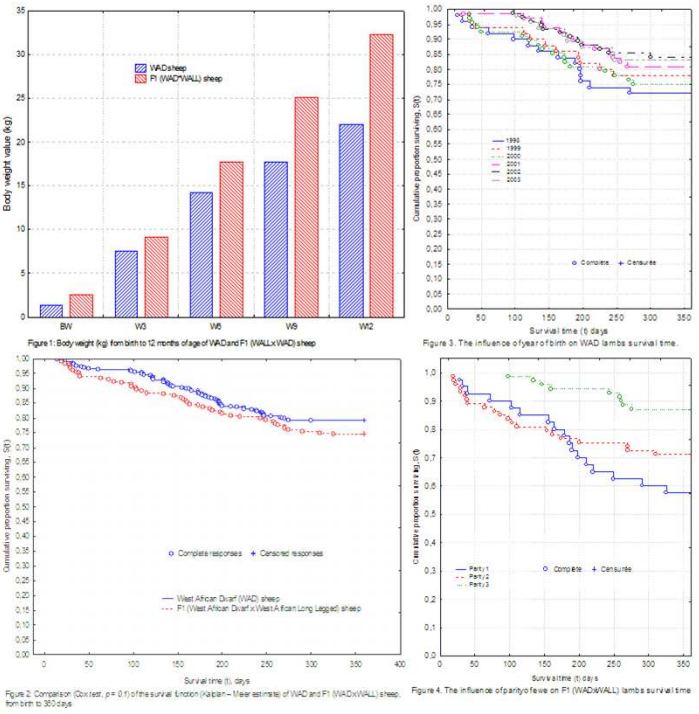

Figure 1: Body weight (kg) from birth to 12 months of age of WAD and F1 (WALLxWAD) sheep

Figure 3. The influence of year of birth on WAD lambs survival time.

Figure 2: Comparison (Cox test, p = 0.1) of the survival function (Kaplan – Meier estimate) of WAD and F1 (WADxWALL) sheep, from birth to 360 days

Figure 4. The influence of parity of ewe on F1 (WADxWALL) lambs survival time

Conclusion

The differences between WAD and F1 (WALL x WAD) lambs, i.e. the similar survival rate and the lowest individual weights and growth rates from birth to 12 months of age for WAD lambs, justified the use of WALL sire breeds to improve potential growth traits in Benin. Environmental effects considered in this study are important and will need to be taken into account for accurate estimation of growth traits. Despite the using of crossbreeding to enhance meat production, the Republic of Benin (West Africa) need also to conserve the genetic diversity and to develop the baseline information on local sheep.

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Caractérisation du mouton Koundoum au Niger: description morphobiométrique et détermination d'une formule barymétrique

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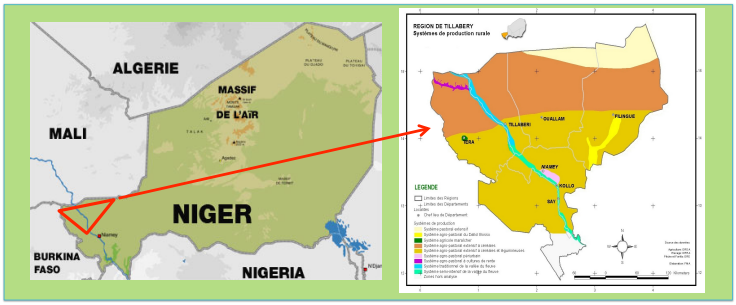
Introduction

La race Koundoum, un des rares moutons à laine du Sahel, est victime des croisements avec d'autres races plus productives et de la dégradation de son biotope originel, le fleuve Niger. Cette race possède des qualités intéressantes d'adaptation au milieu ainsi que de production de laine, qui justifient la mise en œuvre d'un programme de conservation de ce patrimoine génétique original.

Objectif

Cette étude vise à la caractérisation de la race Koundoum afin d'établir les fondements d'un plan pour sa conservation au bord du fleuve Niger dans la région de Tillabery.

Localisation



Matériel et méthodes

Les mesures corporelles et poids vifs de 147 sujets (45 mâles et 102 femelles) ont été collectées au sein de 26 élevages de la région d'étude. Les données obtenues ont été analysées avec le logiciel Statistical Analysis Software.

Résultats

La couleur de robe noire domine (62,6%), suivie de la couleur blanche (27,9%). Les pendeloques sont présentes chez 40,0% des mâles et 26,5% des femelles. Presque tous les béliers portent des cornes (95,6%) contre 3,9% des brebis (Tableau I). Le périmètre thoracique a été retenu pour l'estimation d'une équation barymétrique en raison de sa forte corrélation avec le poids (R^2 = 0,88). Des formules de prédiction du poids (Y) ont pu être proposées en fonction du périmètre thoracique (X) selon le sexe et l'âge (Tableau II).

Tableau I: Présence et absence des caractères morphologiques

			Caractères observés		
			camails	pendeloques	cornes
Femelles	présence	n	1	27	4
		%	0,98	26,47	3,92
	absence	n	101	75	98
		%	99,02	73,53	96,08
	Total	n	102	102	102
Mâles	présence	n	14	18	43
		%	31,11	40	95,56
	absence	n	31	27	2
		%	68,89	60	4,44
	Total	n	45	45	45

Tableau II: Formules de prédiction du poids (y) sur base du périmètre thoracique (x) selon l'âge et le sexe

Age	sexe	Equations de régression
0	F	y = -30,5 + 0,78*x
	M	y = -28,66 + 0,78*x
1	F	y = -30,46 + 0,78*x
	M	y = -28,59 + 0,78*x
2	F	y = - 28,19 + 0,78*x
	M	y = -26,32 + 0,78*x
3	F	y = -28,81 + 0,78*x
	M	y = - 26,94 + 0,78*x

Conclusion

En dépit du manque de contrôle des croisements par la majorité des éleveurs inclus dans l'étude, l'échantillon a révélé des caractéristiques relativement homogènes. La détermination d'une formule barymétrique pourra venir en soutien d'une sélection incluant un objectif de croissance.

Ressources génétiques animales en Kabylie (Algérie)

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Introduction

Caractérisé par la grande diversité de ses conditions pédoclimatiques, l'Algérie dispose des ressources indispensables pour faire face au défi d'un développement agricole durable. Relever ce défi nécessite toutefois une gestion raisonnée, efficiente et coordonnée de ces ressources. Dans le domaine de l'élevage, comme dans les autres secteurs agricoles, le souci de durabilité et d'efficacité mène à privilégier les ressources et capacités locales comme base du développement rural. La connaissance et la préservation des races locales d'animaux de production revêtent donc un caractère crucial à cet égard, seules ces dernières présentant les qualités d'adaptation et d'appropriation nécessaires à la réussite de projets d'élevage. Souvent mal connues et peu décrites dans la littérature, ces races locales sont aujourd'hui en grande partie menacées par la mutation des modes de production. Leur disparition constituerait un désastre, par la perte de caractères ignorés aujourd'hui et potentiellement utiles demain.

Localisation

La Kabylie est une région côtière montagneuse du nord-est algérien.

Objectif

L'objectif de ce poster est de présenter les principales espèces et races élevées en Kabylie, dans l'état des connaissances actuelles.

Présentation par espèce

Ovins

Les ovins sont représentés par la race *Tazegzawt,* récemment répertoriée. Elle est reconnaissable à ses tâches noires à reflets bleuâtres, son nom kabyle signifiant bleu. Son poids peut dépasser 30 kg à 6 mois.

Bovins

La race bovine locale est issue de l'adaptation de la race brune de l'Atlas à un climat tempéré. Elle possède un petit gabarit (250- 300 kg) et une robe grise ou allant du fauve brunâtre au rouge-brun. Malgré la rudesse des conditions d'élevage, le croisement avec des races européennes (pie-rouge, pie-noire) est largement pratiqué.

Poules

Par l'industrialisation de la production de volailles, les poules locales ont subi une érosion génétique sévère. Elles présentent ainsi une grande hétérogénéité phénotypique, s'éloignant des plumages et morphotypes reconnus par les éleveurs comme étant caractéristiques de la race locale. Elles sont de taille moyenne (autour de 1,5kg).

Lapins

Le lapin local semble connaître une situation d'érosion génétique similaire aux poules, suite au développement de systèmes intensifs et à la diffusion de races de chair, bien que ce fait ne soit pas documenté. Son poids est de 2-3 kg.

Caprins

La population locale de chèvres n'a pas fait l'objet de descriptions. Toutefois, la chèvre locale est adaptée aux massifs montagneux. Elle est de petite taille avec un poids vif d'environ 25 kg. Elle présente de longs poils et différentes couleurs de robe.

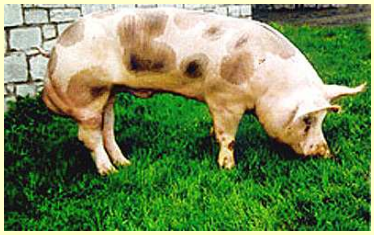
Abeilles

Malgré une tradition apicole très importante en Kabylie, les types d'abeilles exploités n'y sont pas caractérisés.

Conclusion

Toutes les races locales citées ici sont menacées par le croisement ou l'abandon. Leur caractérisation génétique et zootechnique est nécessaire pour l'amélioration des systèmes de production familiaux, plus particulièrement dans la région montagneuse qu'est la Kabylie. En Algérie, comme dans de nombreux pays du Sud, la documentation de la biodiversité d'élevage doit être menée de façon urgente, en étudiant l'insertion de cette biodiversité dans la diversité des modes et objectifs de l'élevage familial.

Performances of the Piétrain ReHal, the new stress negative Piétrain line



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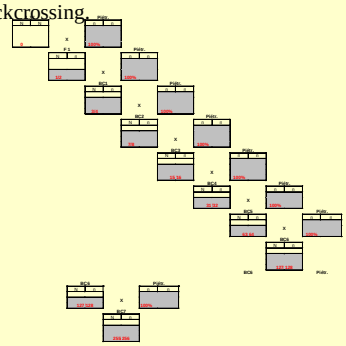
1. Introduction

The new stress negative Piétrain line was launched at the Faculty of Veterinary Medicine of he University of Liège in the 1980's.

The main objectives of the project were defined:

- **Fundamental research on the Halothane locus** and its impact on meat production and quality, especially in a specific genetic background like the Piétrain which is completely different from other halothane positive lines (Nezer *et al.*,1999).
- Increasing requirement for pigs that were completely free of the stress gene:
  - to **reduce carcass loss**
  - to **meet consumer requirements** for a reduction in pre-medication before transport.
- **Production of Piétrain ReHal stress negative homozygote**

The background Piétrain genome has been recovered by successive backcrossing.



Production of the Piétrain ReHal^{cc} from the BC7 pigs

ReHal^{CC} **ReHal^{CT}**

2. The use of Piétrain ReHal boars in station

The objective of the study was to estimate growth and carcass performance of Piétrain ReHal (Nn) boars on commercial sows under station conditions.
3 sow lines were crossed with Piétrain ReHal boars.

Results

- more than 85% of the pigs are in the S and E highest Europ ranking classes,
- feed efficiency of 2.959,
- daily gain during the fattening period of 649 g,
- killing out percentage of 82.6%
- SKG2 meat percent estimation of 58.55%
- back fat thickness of 2.005 cm.

Growth and carcass performance of pigs obtained from Piétrain ReHal boars at the Research Station farm of the University of Liège (380 animals).

Trait	*Mean*	*Std. Dev.*
Birth weight(g)	1592.24	21.94
Weaning weight (g)	7695.18	85.36
Slaughter weight(kg)	114.48	0.74
Carcass length	83.29	0.17
Carcass weight	95.95	0.50
Killing out %	82.65	2.60
Meat % (SKG2)	58.56	0.18
Back fat (cm)	2.005	0.03
pH Loin 1H	6.23	0.01
pH Loin 24 H	5.72	0.01

3. The use of Piétrain ReHal heterozygote (Nn) boars on commercial sow lines

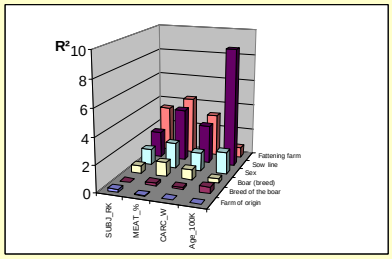
The objective of the study was to estimate growth and carcass performance of Piétrain ReHal (Nn) boars under farm conditions.

Results

- 5,002 piglets were obtained from sows and boars of different genetic origin and from Piétrain ReHal (Nn), Landrace and Piétrain pure bred. All the animals were born on two farms and fattened on 19 farms.
- The data were analysed by a linear fixed model including: fattening farm effect, sow line, sex, boar within breed and breed of the boar.
- The percentage of variation explained by the linear model ranged from 10.1% to 21.9%.
- Differences between breed of boars were significant.
- Piétrain ReHal boars give better results than Landrace boars.

Frequency distribution of Piétrain ReHal boars used on commercial sow lines and least square means of subjective ranking and estimated meat %. (5,008 animals).

Origin of the boars	*Frequency*	*%*	*Subject. Rank.*	*Meat % estim.*
Piétrain (Begium)	3,912	3.8	13.78	59.48
Piétrain (France)	203	2.4	13.93	58.99
Piétrain ReHal	582	4.1	13.99	58.93
Landrace (Belgium)	191	78.1	14.08	57.99
Landrace (France)	120	11.6	14.42	56.95



Percentage of the variation (R²%) of subjective ranking (SUBJ_RK), percentage of meat (MEAT%), carcass weight (CARC_W) and age at 100 kilos (AGE_100K) explained by the different effects included in the linear model.

4. Conclusion

The results indicate that **Piétrain ReHal heterozygote boars** perform quite well and are **close to the Piétrain breed**.

Semen quality of stress negative Piétrain and Duroc boars in the tropics: the case of Vietnam

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2nd Scientific Meeting of the Faculty of Veterinary Medicine, Ulg, Belgium

Introduction

Stress negative Piétrain pig (Piétrain) was developed by the University of Liège, Belgium. Since 2007, they are raised in North Vietnam. The study of semen traits of stress negative Piétrain under tropical conditions is important. The objective of this study is to evaluate the semen quality of stress negative Piétrain and Duroc boars as well as to identify various factors acting on these traits under tropical conditions in Vietnam.

Material and Method

A total of 722 ejaculates from 13 homozygous (Piétrain CC), 7 heterozygous (Piétrain CT) stress negative Piétrain and 10 homozygous Duroc (Duroc CC) boars was collected between 2008 and 2012. The sperm quality was assessed on each ejaculate using ejaculate volume (VOL), spermatozoa motility (MO), sperm concentration (CO) and total number of spermatozoids (NT). Genetic type of boars (Piétrain CC, CT and Duroc CC), season (cold and hot), year (from 2008 to 2012) and (season x year) as well as (genetic type x year) interactions were included in the model as fixed factors. Least square mean (LSM) and standard error (SE) were estimated for each trait

Results and Discussion

Table 1: Semen traits according to the genetic type of boars

	Piétrain CC (n=349)		Piétrain CT (n=171)		Duroc CC (n=202)	
Variable	**LSM**	**SE**	**LSM**	**SE**	**LSM**	**SE**
VOL (ml)	291.74a	4.31	241.40b	5.64	228.05b	5.17
MO (%)	78.64a	0.53	76.08b	0.69	72.35c	0.63
CO (×10⁶ spz/ml)	361.65	9.19	358.29	12.01	356.25	11.03
NT (10⁹)	103.37a	2.36	84.58b	3.08	77.15b	2.83

Means followed by different letters within the rows are significantly different (P<0.05)

The semen quality was influenced by all studied effects (P<0.05) except VOL for season (P=0.45) and season x year (P=0.55), and CO for genetic type (P=0.93).

VOL and NT of Piétrain CC were higher than those of Piétrain CT and of Duroc (P<0.001) although the values of the 3 genetic groups are in the range of normal semen.

Table 2: Semen traits according to the cold and hot seasons

	Cold (n=269)		Hot (n=453)	
Variable	**LSM**	**SE**	**LSM**	**SE**
VOL (ml)	251.57	4.56	255.89	3.68
MO(%)	77.67a	0.56	73.71b	0.45
CO (×10⁶ spz/ml)	379.44a	9.72	338.02b	7.83
NT (10⁹)	92.41a	2.49	84.33b	2.01

Means followed by different letters within the rows are significantly different (P<0.05)

Conclusion

The semen of stress negative Piétrain and Duroc boars could be used in tropical climatic conditions (particularly Piétrain CC) and the semen quality could probably be improved through reduction of heat stress.

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Stress negative Piétrain boars and their hybrids
Growth performances and semen quality

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THE 3rd INTERNATIONAL CONFERENCE ON SUSTAINABLE ANIMAL AGRICULTURE FOR DEVELOPING COUNTRIES
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Introduction

Stress negative Piétrain pig (Piétrain) was developed by the University of Liège (ULg), Belgium. Since 2007, they have been raised under tropical conditions in North Vietnam; the project is supported by the "Commission Universitaire pour le Développement" (CUD), FVM-ULg and Hanoi University of Agriculture (HUA). The Piétrain boar is used not only as a terminal boar but also as a genetic resource for the production of hybrid boars with Duroc. The objective of this study is to evaluate the growth performance and semen quality of stress negative Piétrain boars and their hybrids in the North of Vietnam.

Material and Method

A total of 15 boars from 3 genetic groups were used for this study, including 5 Piétrain boars (purebred *Piétrain*), 5 ♀Duroc × ♂Piétrain (½ *Piétrain*) and 5 ♀(Piétrain × Duroc) × ♂Duroc (¼ *Piétrain*). Testing period started at an average age of 60 days and ended at an average age of 225 days. The **growth performance** was weights at starting (*W at 2 months*) and finishing (*W at 7.5 month*) periods, average daily gain (*ADG*), backfat thickness, longissimus depth and lean content. The **semen quality** was assessed using ejaculate volume (*V*), spermatozoon motility (*A*), sperm concentration (*C*), total number of spermatozoon in the ejaculate (*VC*), rate of abnormal spermatozoon (*R*) and pH of semen (pH). All these measurements were used to compare the genetic groups.

Results and Discussion

	Piétrain		½ Piétrain		¼ Piétrain	
Variable	Mean	SD	Mean	SD	Mean	SD
W at 2 month (kg)	17.78	1.54	18.18	3.10	15.54	3.11
W at 7.5 month (kg)	112.95	7.11	114.50	10.00	116.20	10.53
ADG (g)	571.53	33.86	673.80	49.14	615.80	68.11
Backfat (mm)	8.92	1.01	9.24	1.26	10.70	2.89
Longissimus depth (mm)	60.94^{a}	4.92	55.10^{ab}	4.78	52.94^{b}	3.17
Lean content (%)	64.42^{a}	0.80	62.74^{ab}	1.26	60.69^{b}	2.97

Means followed by different letters within the rows are significantly different (P<0.05)

	Piétrain			½ Piétrain			¼ Piétrain		
Variable	n	Mean	SD	n	Mean	SD	n	Mean	SD
V (ml)	83	264.94^{a}	79.67	40	256.50^{a}	57.77	25	214.40^{b}	67.33
A (%)	83	79.88^{a}	6.72	40	75.50^{b}	6.68	25	75.40^{b}	6.44
C (×10^{6} spz/ml)	83	423.02^{a}	136.75	40	562.85^{b}	233.10	25	650.60^{c}	212.65
VC (10^{9})	83	110.68^{a}	45.03	40	146.33^{b}	67.49	25	133.29^{ab}	46.50
R (%)	75	5.58	2.37	38	6.13	3.05	24	5.11	3.71
pH	74	7.31^{a}	0.24	39	7.35^{ab}	0.25	23	7.44^{b}	0.23

Means followed by different letters within the rows are significantly different (P<0.05)

Conclusion

- The average daily gain of stress negative Piétrain boar purebred was not significantly different from Piétrain hybrids while the lean content is higher.
- The semen volume and the spermatozoon motility of stress negative Piétrain purebred boars were higher than Piétrain hybrids but the sperm concentration and the total number of spermatozoon in the ejaculate were lower.

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Genetic parameters for individual weights at birth, weaning and 60 days of stress negative Piétrain pigs in the tropics: the case of Vietnam

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Introduction

Since 2007, stress negative Piétrain pigs have been raised as nucleus herd in North Vietnam from initial 19 animals (6 males and 13 females) imported from the University of Liege, Belgium. They have demonstrated their adaptation. However reproductive performance can be influenced by tropical climatic conditions. Genetic parameters for reproduction traits have to be estimated for these pigs to implement selection and genetic improvement programs. The objective of this study is to estimate genetic parameters for individual weights at birth, weaning and 60 days of stress negative Piétrain pigs in Vietnam.

Material and Method

Data recorded between 2008 and 2012 from Dong Hiep pig farm, Vietnam, was used to estimate genetic parameters for weights at birth (WB), weaning (WW) and 60 days (W60) of stress negative Piétrain pigs using restricted maximum likelihood methodology. WB, WW and W60 were recorded from 1146, 839 and 610 animals respectively. The data were analyzed using MTDFREML software according to a mixed model including 4 fixed effects, parity, season, sex, and interaction between halothane genotype and country of origin (Belgium and Vietnam) of sows. Additionally, 3 random effects (maternal common environment for litter, direct and maternal additive genetic) for WB and 2 random effects (maternal common environment for litter and direct additive genetic) for WW and W60 were included in the model. Variance components and heritability were estimated for each trait

Results and Discussion

Estimated variance components for individual weights at birth, weaning and 60 days

Parameters	WB	WW	W60
σ^2_a	0.01366	0.40004	1.60019
σ^2_m	0.00968	-	-
σ^2_c	0.00931	0.378651	2.53214
σ^2_e	0.03725	1.00214	4.36605
σ^2_p	0.06989	1.78083	8.49838

σ^2_a, σ^2_m, σ^2_c, σ^2_e, σ^2_p are additive direct genetic, additive maternal genetic, maternal common environment for litter, residual environmental and phenotypic variances

The direct heritability of WB, WW and W60 in this study was higher than those in the reported of Fix (2010) but lower than Roehe et al. (2009). A small beginning herd might be a cause. However, maternal heritability was consistent with another study. Genetic correlation can't be estimated due to the unbalanced data and limited number of observations.

Heritability ± standard error for individual weights at birth, weaning and 60 days

Parameters	WB	WW	W60
h^2	0.20±0.14	0.22±0.14	0.19±0.14
m^2	0.14±0.09	-	-
c^2	0.13±0.05	0.21±0.06	0.30±0.06
-2 log *L*	-2183.457	1164.129	1748.032

h^2, m^2, c^2 are direct heritability, maternal heritability and maternal common environment variances in proportion to total variances

Conclusion

The direct heritability was high. WB, WW and W60 could be improved by selection using both direct and maternal effects.

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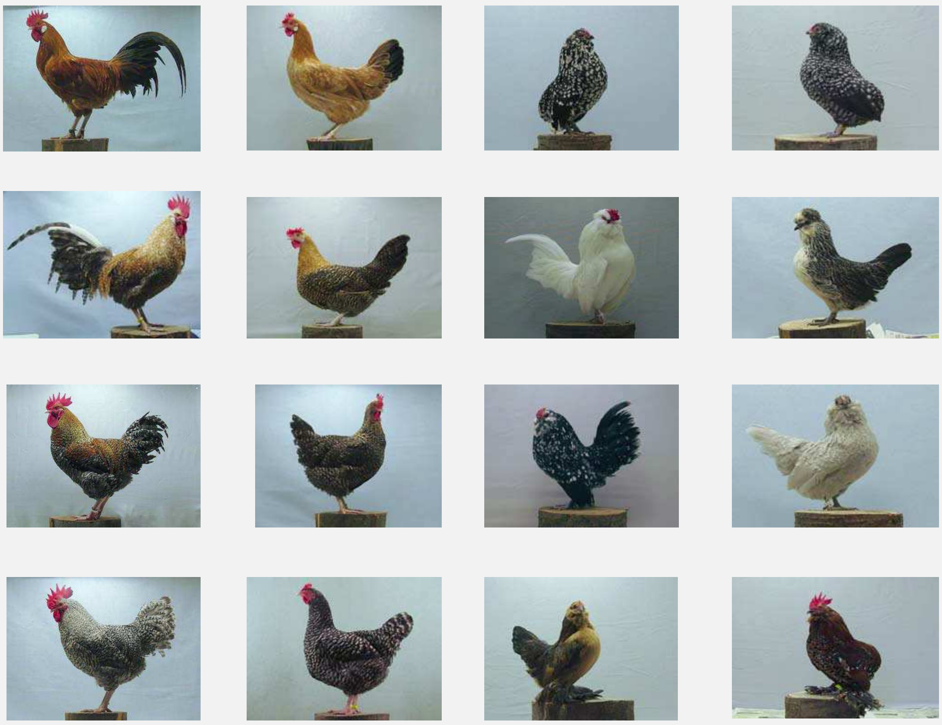
Poultry breeds of Belgium

The diversity in domestic animal populations, resulting from selection carried out in various breeding systems, has decreased quickly due to the extensive production programs of the second half of the XXth century. A few highly specialized and productive breeds have been selected and disseminated across the planet at the expense of local breeds, which are less profitable, and therefore at the expense of biodiversity.

In Europe where commercial strains dominate the market of animal products, old breeds are among the most threatened in the Word. Hence, the situation of avian genetic resources is in Europe particularly alarming.

Ninety five percent of Belgian hen breeds are overwhelmingly under threat of extinction. It is necessary to guarantee the reproduction of the animals in the best possible conditions, and to limit the risks of increase in consanguinity.



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Padang, West Sumatra, Indonesia

COMPARATIVE EVALUATION OF LOCAL POULTRY BREEDS STATUS
IN ALGERIA, VIETNAM AND THE DEMOCRATIC REPUBLIC OF CONGO

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INTRODUCTION

Animal genetic resources are crucial to the sustainable development of poultry production. However, a gradual and relentless depleting of available breeds is now rife at the global scale. Local chicken breeds contribute significantly to the world production of meat and eggs. Indigenous breeds represent 80% of the world poultry population. However, the majority of these breeds has not been recorded and studied (Besbes, 2009). About 40% of poultry breeds have an unknown risk status and considerable efforts are necessary to evaluate them (FAO, 2008). Backyard poultry farming plays an important role in poverty alleviation and in providing food security in developing countries. In some African and Asian countries, the local chicken breed is the sole source of animal protein to be found in the diet of rural dwellers. On top of being a source of income, the backyard chicken represents a form of holding in those areas. The management of animal genetic resources in general and poultry in particular requires the identification of the phenotypes, population sizes and geographical distribution, as well as the genetic diversity within and between breeds using molecular biology methods. Nevertheless, without understanding the breeding contexts within which this genetic diversity is found, no sustainable management strategy can be set up.

MATERIAL AND METHODS

A. Survey of households keeping backyard poultry

This study investigates backyard and small-scale poultry keeping characteristics in Algeria, Vietnam and in the Democratic Republic of Congo (DRC). A survey has been carried with 90 local chicken breeders from 10 districts of Kabylia region (Algeria), 52 local chicken breeders from 3 districts of Hanoi and Hoa-Binh province (Vietnam) and 77 local chicken breeders from 3 districts of Bas-Congo province (DRC). The semi-structured interviews covered household characteristics, poultry keeping practices and motives as well as breed description, management and perceived evolution.

B. Morpho-biometric characterization

Adult males and females (Algeria: 162 and 153, Vietnam: 187 and 59; DRC: 351 and 140, respectively) were used for morpho-biometric characterization. The different body measurements were recorded in accordance with the FAO recommendations (1981), by means of a digital balance, an electronic sliding caliper and a tape measure. The data collected were sex, body weight and reported age of animal, thoracic girth, feathers type and color, the comb's type, length, height and color, wattles height and color, tarsus length and diameter, wings length as well as the length and color of the beak.

RESULTS

Table 1. Relative livestock distribution (%) by species in the surveyed households

Species	% households - (n)		
	Algeria (n=90)	DRC (n=77)	Vietnam (n=52)
Chicken	100 (23)	100 (36)	100 (77)
Sheep	86.67 (12)	7.79 (4)	-
Rabbit	64.44 (12)	7.79 (4)	-
Goat	44.44 (8)	44.20 (3)	-
Cattle	37.78 (8)	-	11.54 (8)
Turkey	25.56 (10)	-	-
Duck	20.00 (6)	7.79 (9)	13.46 (11)
Pig	-	13.0 (5)	67.31 (10)
Guinea pigs	-	20.80 (8)	-
Pigeons	-	2.60 (8)	-
Buffalo	-	-	50.00 (6)
Dog	-	-	26.92 (8)

Table 2. Phenotypic characteristics of local chicken population evaluated in Algeria, Vietnam and DRC

Variable	Algeria	DRC	Vietnam
Feather colors			
Number of colors (n)	17	20	13
Normal distribution (%)	95.9	85.3	100
Bare-neck (%)	4.1	6.1	0
Smooth type (%)	100	98.4	100
Weight and age of slaughter and diameter of tarsus			
Weight (kg)	1.46	0.93	1.56
Age of slaughter (month)	9	14	9
Diameter of tarsus (mm)	13.7	-	13.6

A. Survey of households keeping backyard poultry

- The livestock portfolio of poultry farmers is diversified in all three regions (Table 1). In Algeria, poultry keepers mostly keep sheep (86.7%). In the DRC and Vietnam, respectively 44.2% and 67.3% of poultry farmers keep pigs.
- In Algeria and DRC, women are in charge of poultry breeding in 81.1% and 42.9% of interviewed households whereas in Vietnam, all family members are involved in this activity in most cases (90.4%). How the first chickens are obtained differs from region to region. In the DRC, they are mainly bought (45.5%) and shared (29.9%); in Algeria, they are obtained as gifts (40.0%) and through inheritance (35.5%) and in Vietnam it is more through inheritance (67.0%) and buying (25.0%).
- Motives of farmers for keeping backyard poultry are egg production (Algeria: 57.8%, Vietnam: 23.1%, DRC: 0%) and meat (Algeria: 52.2%; Vietnam: 96.1%, DRC: 45.5%). The choice of the native breed was most often motivated by tradition (Algeria: 53.3%; Vietnam: 80.8%, DRC: 59.7%), the culinary and nutritional quality of chicken meat and eggs (Algeria: 88.9%; Vietnam: 65.4%; DRC: 15.6%), resilience of animals (Algeria: 73.3%; Vietnam: 88.5%; DRC: 53.3%) and ease of care (Algeria: 65%; Vietnam: 90.4%; DRC: 75.3%).
- All farmers in Algeria and Vietnam and 77% in DRC provided supplementary feeding to their chickens as follows: kitchen leftovers (97.8%, 88.5% and 65.5%), crops and their residuals (2.2%, 65.5% and 94.2%). In the DRC, 10.4% of chicken breeders use a nutrition formula: 50% of corn, 30% of soya and 20% of manioc (10% of leaves and 10% of spuds), suggested by a locally active NGO, while 22.1% of farmers do not feed their chickens.
- The majority of backyard chicken keepers in Vietnam (84.6%) never provide water to the birds; only 20.8% of farmers being in that case in the DRC. In Algeria, all farmers provide water to the birds.
- Drinking water sources cited are the water tap (Algeria: 43.3%; Vietnam: 5.8%; DRC: 5.2%), the well (Algeria: 47.8%; DRC: 16.9%) and other sources (streams, springs, fountains...) (Algeria: 8.9%; Vietnam: 52.2%; DRC: 9.6%).
- The mainly cited constraints on the productivity of small-scale poultry are predators (Algeria: 50.0; Vietnam: 73.5%; DRC: 93.5%), diseases (Algeria: 5.6%; Vietnam: 26.9%; DRC: 80.5%), expensive chicken feed (Algeria: 57.8%; Vietnam: 25%; DRC: 22.1%) and theft, cited by 26% of the chicken farmers of the DRC.

B. Morpho-biometric characterization

Color diversity has been observed in the three countries (Table 2). White, black, silver, golden and brown represent 65% of the colors of the subjects studied in Algeria. In the DRC, mottled, tan, white, golden, black, golden salmon, and brown represent 65%. Tan, golden salmon and wheat represent 65% of the colors of the subjects studied in Vietnam. Plumage showed a normal coverage of the body. Only 4.1% of bare-neck chickens have been observed in Algeria and 6.1% in the DRC and none in Vietnam.
Plumage is exclusively of the smooth type (Table 2). Weight and age of slaughter as well as the diameter of tarsus are highlighted in Table 2.
The comb is almost exclusively of the simple type (Algeria: 93.3%; Vietnam: 90.7%; DRC: 92.4%) and red (Algeria: 83.8%; Vietnam: 100%; DRC: 90.4%).

CONCLUSION

Chicken genetic diversity has to be managed in diverse socio-economic and cultural contexts. Full account should be taken of these contexts in order to evaluate the feasibility and opportunity for in-situ conservation and improvement schemes. Where in-situ conservation is not feasible, the peculiarity of a breed may justify ex-situ strategies.

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EGG QUALITY COMPARISON OF TWO VIETNAMESE CHICKEN BREEDS (RI AND MIA)

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INTRODUCTION

Aviculture is a very important sector of livestock in Vietnam, occupying the 2nd position after the swine sector. It is dominated by local breeds with 158 millions local poultry. The local hen breeds combined with the local duck breeds, represent over 89% of the total national Vietnamese avian population (Eaton *et al.*, 2006). In the context of the valorization of poultry biodiversity, this work represents a step toward a better knowledge of the production abilities of Vietnamese local chicken breeds. Local chicken breeds are indeed particularly well suited for low-input rearing systems, as widely practiced in rural households of Vietnam. The socio-economic importance of these breeds might be underpinned by a market valorization through the mounting of differentiated quality value chains. Such a strategy needs the production potential of these local breeds to be assessed from parameters of egg quality and quantity. This study presents data about egg quality traits in two chicken breeds, the Ri and the Mia. The former is the most widespread breed of Vietnam, while the latter is known to be in danger of extinction. Quality of the eggs is assessed through the freshness of the eggs, represented in this study by Haugh's units (HU), the soundness of the shell, which is the second most important economic quality of eggs, represented by the eggshell thickness and by the maximal breaking force of the shell (Moula *et al.*, 2010), and the yolk to albumen ratio, for which high proportion of yolk are sought because it has a significant impact on the dry matter content of eggs, which is an essential criterion in the industry.

MATERIAL AND METHODS

Egg quality traits (egg weight, yolk weight, egg shell weight, albumen weight, percentage of albumen, percentage of yolk, percentage of egg shell, yolk-albumen ration, albumen height, Haugh's units, yolk diameter and yolk color) were taken the day after egg collection in the laboratory of Department of Animal Breeding and Genetics, the Faculty of Animal Science and Aquaculture, Hanoi University of Agriculture (Vietnam). The analyses were conducted using 40- and 60-weeks old hens. Egg quality traits were measured according to the method described by Moula et al. (2010). The SAS Software (Statistical Analysis System, 2001) was used for all statistical analyses. Breed and age effect on each parameter was assessed using the following general linear model:

$$y_{ijk}=\mu + A_i + B_j + (AB)_{ij} + e_{ijk}$$

where y represent the studied parameters measured on the egg; μ the mean; A the effect of breed (i= Mia and Ri); B the effect of age (j= 40 and 60 weeks); AB the interaction between breed and age; and e the residual effect.








RESULTS

Table 2. Least square means (lsmean ± SE) for exterior egg quality traits

Paramètres	Age (weeks)	Breeds		Level of signification			R^2
		Mia	Ri	Age	Breed	Age*Breed	
Egg length (mm)	40	50.73±0.36[a]	48.86±0.28[b]	***	***	ns	0.32
	60	52.56±0.36[a]	50.70±0.31[b]				
Egg widh (mm)	40	39.15±0.24[a]	37.89±0.19[b]	***	*	**	0.27
	60	39.53±024	39.76±0.21				
Egg Shape	40	76.85±0.57	77.51±0.45	ns	**	*	0.10
	60	75.65±0.57[a]	78.56±0.49[b]				
Eggshell thickness ($x10^{-2}$)	40	32.09±0.57	32.50±0.45	***	***	***	0.40
	60	32.31±0.58[a]	26.56±0.51[b]				
F max (newton)	40	36.50±1.21	36.66±0.95	*	ns	ns	0.06
	60	40.79±1.23[a]	37.89±1.05[b]				

On a same row, values bearing a same letter are statistically not different ($p < 0.05$). ***: $P < 0.001$; **: $P < 0.01$; *: $P < 0.05$; $P \geq 0.05$. R^2: coefficient of determination

Quantitative traits measured on eggs of 40-weeks and 60-weeks old hens are presented in Table 1 and 2. Mean egg weight of Mia was significantly ($p<0.001$) higher than that of Ri. The yolk to albumen ratio was significantly different ($p<0.01$) between the two breeds. No significant difference ($p>0.05$) was recorded between the two breeds for egg freshness assessment (Haugh's units) and eggshell resistance (maximum breaking force).

In the present study, egg weight, yolk weight, egg shell weight and albumen weight increase according to age. However the difference is not very important for the main quality traits of eggs (freshness, egg shell strength, and the ratio yellow/white and egg weight).
Egg weight in this study was lower than industrial egg while the yolk weight and yolk-albumen ratio was higher. The soundness of the shell was similar (De Ketelaere *et al.*, 2002). The freshness of the egg is represented in class AA according to USDA grade (USDA, 1975).

Table 1. Least square means (lsmean ± SE) for interior egg quality traits

Parameters	Age (weeks)	Breeds		Level of signification			R^2
		Mia	Ri	Age	Breed	Age*Breed	
Egg weight (g)	40	42.79±0.69[a]	38.79±0.54[b]	***	***	*	0.41
	60	46.60±0.69[a]	45.21±0.60[b]				
Yolk weight (g)	40	14.08±0.37[a]	12.32±0.27[b]	***	***	ns	0.33
	60	15.76±0.34[a]	14.67±0.30[b]				
Egg shell weight (g)	40	4.21±0.10[a]	3.80±0.08[b]	***	***	ns	0.45
	60	5.08±0.10[a]	4.59±0.08[b]				
Albumen weight (g)	40	24.23±0.68	22.73±0.51	***	ns	ns	0.15
	60	25.76±0.63	26.04±0.56				
% Albumen	40	56.90±0.83	58.22±0.62	ns	**	ns	0.74
	60	55.03±0.77[a]	57.43±0.68[b]				
% Yolk	40	33.20±0.78	31.82±0.58	ns	*	ns	0.04
	60	34.08±0.73	32.45±0.65				
% Egg shell	40	9.86±0.18	9.83±0.14	*	*	*	0.14
	60	10.90±0.18	10.15±0.16				
Y:A ratio (%)	40	0.58±0.02	0.55±0.01	ns	**	ns	0.10
	60	0.64±0.02[a]	0.57±0.02[b]				
Albumen height (.01mm)	40	5.51±0.25	5.67±0.20	*	ns	ns	0.06
	60	4.78±0.25	5.27±0.22				
Haugh's units	40	78.92±1.75	80.88±1.36	**	*	ns	0.10
	60	72.49±1.72	76.14±1.51				
Yolk diameter (mm)	40	39.12±0.40[a]	36.53±0.30[b]	*	***	*	0.23
	60	39.05±0.37[a]	38.13±0.32[b]				
Yolk coloration	40	10.89±0.18	10.55±0.13	*	**	ns	0.10
	60	10.72±0.17[a]	10.08±0.15[b]				

CONCLUSION

The performances of both breeds appear to be highly interesting since market demand is for eggs with a higher yield in dry mater (high yolk to albumen ratio) and eggs with strong shell (maximal breakage force); this observation is of particular interest when considering that none of these breeds underwent any previous selection process, which possibly implies that even more benefits could be obtained after selection. Further breeding for these traits could thus be considered in these local breeds.

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Quality characteristics of marketed eggs in Basse Kabylie (Algeria)

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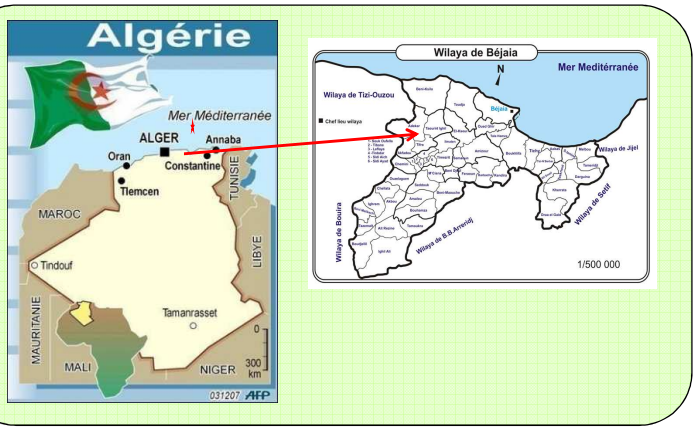
Introduction

Hen's eggs have been traditionally considered as an important source of nutrients for humans. Indeed, the egg belongs to the limited category of complete protein foods, containing the nine amino acids that human cannot synthesize. Thus, it has been chosen by World Health Organization (W.H.O.) as the reference protein source for the child. The low cost of eggs makes them a widely available source of proteins and lipids. In addition they are generally not subject to cultural or religious prohibition. Variability in the quality of eggs available to consumers have been reported by many investigators. However, little is known about the quality of eggs offered to consumers in Algeria.

Objective

The aim of this study is to investigate the quality of eggs according to the marketing channel in the department of Bejaia in Basse Kabylie, Algeria.

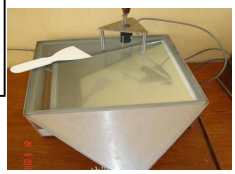
Localisation



Material and methods

In spring and summer 2012, eggs were bought in 30 different stores divided into 3 categories:

- 10 supermarkets (1146 eggs),
- 10 local markets (1048 eggs),
- 10 food shops (1136 eggs).



Results

Table 1- Distribution of weight classes and damage frequency of eggs obtained from three retailing channels

	Retailing Channels			Sign.
	Food shops	Local markets	Supermarkets	
Weight classes (%)				
Extra-Large	1.23	1.53	9.42	***
Large	24.30	13.45	30.72	***
Medium	73.24	73.00	59.86	***
Small	1.23	12.02	-	***
Damaged eggs (%)	7.31	8.97	5.67	*

Table 2- Least Squares Means and standard errors of quality measurements and price of eggs from three retailing channels

	Retailing Channels		
	Food shops	Local markets	Supermarkets
Egg weight (g)	61.22 0.13^{x}	58.94 0.14^{y}	62.83 0.13^{z}
Y/A ratio	47.31 0.11^{a}	47.53 0.11^{a}	47.98 0.11^{b}
Haugh unit	77.56 0.44^{x}	74.26 0.46^{y}	79.92 0.44^{z}
Yolk color	11.19 0.05	11.07 0.05	11.23 0.05
Shell thickness (.01mm)	36.84 0.12	37.11 0.12	37.46 0.12
Price/kg egg (DA)	129.23 2.53^{x}	123.75 2.53^{y}	133.02 2.53^{x}

^{a,b,c}: Values with different superscripts are significantly different ($p<0.05$)

$^{x, y, z}$: Values with different superscripts are significantly different ($p<0.001$)

Conclusion

- **Eggs quality varies significantly according to the retailing channel in Basse Kabylie. Higher quality is observed in supermarket.**
- **The lower quality of eggs bought in local markets is associated with lower price.**
- **For most of the parameters, eggs from food shops present intermediate values.**
- **More detailed studies during the whole year are needed to determine the potential effect of the season on quality of eggs.**

Caractérisation des performances d'élevage et de production de deux variétés de la race Ardennaise

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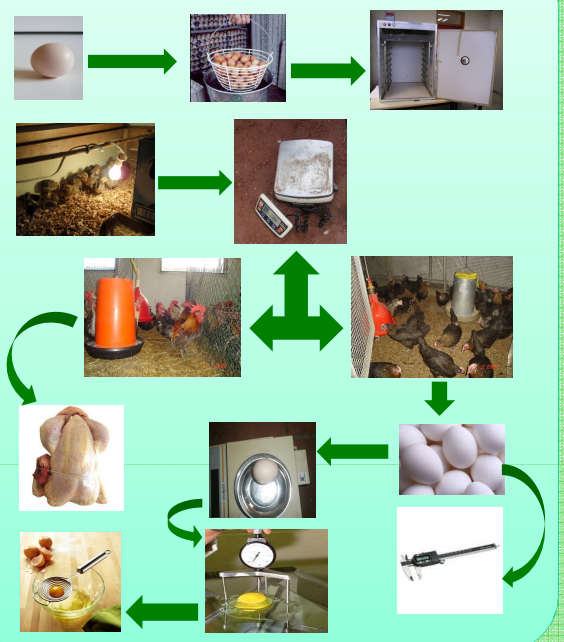
Introduction

La poule Ardennaise est une race emblématique de la biodiversité avicole belge. Cette étude est consacrée à la comparaison de deux variétés de la race Ardennaise (Noire Dorée et Noire Argentée). La comparaison est réalisée par le biais de trois études: (1) caractérisation morpho-biométrique des deux variétés; (2) suivi de la croissance et étude de la qualité de la carcasse et de la viande; (3) le suivi du taux de ponte pendant 52 semaines ainsi que l'étude de la qualité des œufs à 30, 45, 60 et 75 semaines d'âge.

Matériel et Méthodes



Résultats

Des différences significatives étaient enregistrées au niveau des poids corporels, du grand diamètre du tarse, de la longueur du tarse et de la taille de la crête des deux variétés.

Tableau 1 – Comparaison de la qualité des œufs entre deux variétés d'Ardennaise par âge (moyennes moindres carrés et erreurs standards)

Paramètres/âges	NA		ND		Significations			R^2
	n	LSM ± SE	n	LSM ± SE	Variété	Age	Interaction	
Poids entier (g)					***	***	**	85,11
À 30 semaines	10	45,28±0,60^a	15	41,93±0,49^b				
À 45 semaines	20	51,34±0,42^a	30	48,04±0,35^b				
À 60semaines	15	53,06±0,49	25	53,16±0,38				
À 75 semaines	10	57,24±0,60^a	15	55,89±0,49^b				
Ratio Jaune/albumen					*	***	NS	23,65
À 30 semaines	10	49,72 ±1,90	15	52,03±1,55				
À 45 semaines	20	53,18±1,34	30	52,12±1,10				
À 60 semaines	15	53,80±1,54^a	25	59,49±1,20^b				
À 75 semaines	10	56,38±1,90	15	58,85±1,54				
Epaisseur de la coquille					NS	*	NS	8,29
À 30 semaines	10	33,08±0,87	15	32,59±0,71				
À 45 semaines	20	31,88±0,62	30	31,40±0,50				
À 60 semaines	15	31,18±0,87	25	30,90±0,71				
À 75 semaines	10	30,65±0,72	15	30,84±0,55				
pH de l'albumen					**	***	**	43,70
À 30 semaines	10	8,62±0,27^a	15	8,79±0,02^b				
À 45 semaines	20	8,88±0,02	30	8,88±0,01				
À 60 semaines	15	8,91±0,02	25	8,90±0,02				
À 75 semaines	10	8,85±0,03	15	8,89±0,02				

*** P < 0,001; ** P < 0,01; * P < 0,05; NS: P>0,05, LSM ± SE: Least Square Means ± Standard Error; a, b: on a same line, different letters are assigned to values showing statistically significant differences between them (p<0,05)


Noire Argentée (NA)


Noire Dorée (ND)

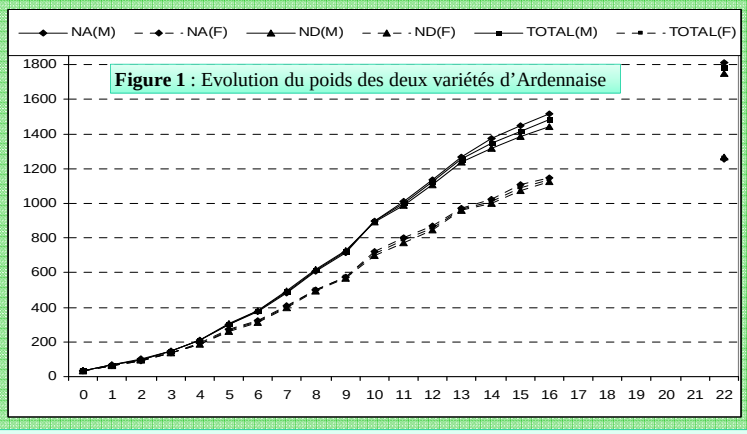


Figure 1 : Evolution du poids des deux variétés d'Ardennaise

Tableau 2– Comparaison du rendements carcasse, du pH ultime et de la couleur de la viande de deux variétés d'Ardennaise

Paramètres /âges	NA		ND		Significations	R2
	n	LSM ± SE	n	LSM ± SE	Variété	
Rendement						
Male	4	67.30±0.95	5	68.56±0.85	**	.47
Femelle	4	64.59±0.95	5	65.29±0.85		
pH Ultime						
Male	4	5.68±0.04	5	5.73±0.04	NS	.12
Femelle	4	5.70±0.04	5	5.67±0.04		
Intensité jaune						
Male	4	12.41±1.53	5	12.66±1.53	NS	.17
Femelle	4	13.19±1.53	5	13.60±1.25		
Intensité rouge						
Male	4	2.88±0.45	5	3.43±0.45	NS	.12
Femelle	4	3.02±0.45	5	2.27±0.37		
luminosité						
Male	4	52.46±1.33	5	53.13±1.19	NS	.37
Femelle	4	48.35±1.33	5	52.03±1.19		

** P < 0,01; NS: P>0,05; LSM ± SE: Least Square Means ± Standard Error

Conclusion

Pour plusieurs caractères morphologiques, de croissance et de ponte, les deux variétés ne présentent aucune différence. Cette étude devrait donc être complétée par une analyse moléculaire, usant de marqueurs moléculaires pour préciser le degré de similitude génétique entre les deux variétés et éventuellement avec les autres variétés de la race. En l'absence de différences et eu égard au nombre restreint d'individus de chaque variété, le brassage des variétés subsistantes pourrait être envisagé pour la sauvegarde de la race.

Comparaison de la qualité des œufs de la race de poule locale Kabyle et de son croisement avec la souche industrielle Isa-Brown

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Contexte et objectif

Sur terre, une personne meurt de faim toutes les quatre secondes !... La FAO avait pourtant fixé des objectifs ambitieux pour la réduction de ces mortalités, ce qui devait constituer un des grands enjeux du Millénaire mais la faim ne recule pas suffisamment pour réduire significativement ces chiffres. La sous-alimentation dans le monde concerne aujourd'hui un milliard de personnes. Les carences alimentaires, lorsqu'elles ne sont pas imputables aux guerres ou aux conflits, sont généralement directement liées au niveau de développement des pays concernés. L'Amérique du sud, l'Asie et surtout l'Afrique, sont aujourd'hui les premières régions touchées. L'Afrique sub-saharienne représente à elle seule plus de la moitié des pays mal-nourris recensés par la FAO et près du quart de la population mal nourrie. En dehors des cas de famine, la nourriture disponible dans les pays où la faim est significative est généralement suffisante pour couvrir les besoins en calories de la population. La difficulté essentielle réside en fait dans l'équilibre de cette alimentation qui manque la plupart du temps de protéines d'origine animale. Ces carences sont directement responsables des problèmes sanitaires qui affectent en priorité les enfants et les femmes (par exemple, les maladies du type kwashiorkor) (Moula et al., 2012). Le faible prix de revient des œufs en fait une source de protéines et de lipides animales de faible coût.

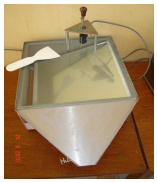
La qualité de l'œuf de poule et les performances de ponte peuvent varier en fonction de la race (Moula et al., 2010). Dans les systèmes d'élevage extensifs à semi-intensifs des pays en développement, le croisement entre une race de poule locale et une souche industrielle pourrait constituer une opportunité, délivrant un produit commercial alliant rusticité et performances zootechniques. Dans un contexte mondial d'érosion de la biodiversité avicole, ce type de croisement apporte une motivation économique à la conservation de la lignée parentale locale. Le but de cette étude est de comparer le taux de ponte et la qualité des œufs, en termes de composition, de la race de poule locale Kabyle (KAB) et de son croisement (ISAKAB) avec la souche industrielle Isa-Brown (ISA).

Matériel et méthodes

Des poules de la race Kabyle et de son croisement avec la souche industrielle Isa-Brown (ISA)ont été testées dans des conditions d'élevage intensives. La croissance, l'efficacité alimentaire et la mortalité ont été relevées jusqu'à l'âge de 77 semaines. Les analyses sur la qualité des œufs ont été réalisées durant trois périodes (semaines 35 à 36, 50 à 51 et 65 à 66).





Résultats

Tableau 1 : Moyennes moindres carrés et erreurs standards (LSM ± SE) des différents paramètres étudiés.

Paramètres	Age	Génotype (Gén)		Niveau de signification			R^2
		KABYLE	ISA-KABYLE	Gén	Age	Gén x Age	
Poids de l'œuf (g)	35	43,70 ± 0,34^a	49,99±0,27^b	***	***	***	0,72
	50	49,54±0,27^a	53,70±0,26^b				
	65	53,37±0,30^a	57,13±0,29^b				
Poids du blanc (g)	35	25,38±0,27^a	29,38±0,22^b	***	***	*	0,56
	50	28,63±0,21^a	31,41±0,21^b				
	65	30,05±0,24^a	32,78±0,26^b				
Poids du jaune (g)	35	13,60±0,22^a	15,48±0,17^b	***	***	***	0,52
	50	16,03±0,17^a	17,00±0,17^b				
	65	17,98±0,19^a	18,91±0,21^b				
Poids de la coquille (g)	35	4,72±0,09^a	5,14±0,07^b	***	**	NS	0,13
	50	4,88±0,07^a	5,28±0,07^b				
	65	5,34±0,08	5,48±0,09				
Pourcentage du blanc (%)	35	58,08±0,37	58,76±0,29	**	***	NS	0,10
	50	57,81±0,28	58,51±0,28				
	65	56,31±0,32^a	57,31±0,34^b				
Pourcentage du jaune (%)	35	31,09±0,35	30,94±0,28	*	***	NS	0,14
	50	32,33±0,28	31,65±0,27				
	65	33,68±0,31	33,10±0,33				
Pourcentage de la coquille (%)	35	10,83±0,17^a	10,30±0,14^b	NS	***	NS	0,08
	50	9,86±0,14	9,84±0,13				
	65	10,01±0,15	9,60±0,16				
Epaisseur de la coquille (10^{-2})	35	34,89±0,43^a	38,48±0,34^b	***	***	**	0,33
	50	33,70±0,33^a	36,42±0,33^b				
	65	32,75±0,37	33,60±0,40				
Forme de l'œuf	35	76,98±0,14^a	77,83±0,11^b	***	***	NS	0,62
	50	75,79±0,11^a	76,81±0,11^b				
	65	74,29±0,13^a	74,86±0,13^b				
Rapport J:B	35	52,34±0,95^a	55,75±0,75^b	NS	***	**	0,11
	50	55,70±0,74	54,17±0,72				
	65	59,77±0,83	57,79±0,89				
Unités d'Haugh (UH)	35	80,59±0,48	81,45±0,51	NS	***	NS	0,48
	50	84,30±0,42	83,38±0,41				
	65	90,02±0,54	89,76±0,43				

Tableau 2 : Taux de mortalités.

Période	Génotype		P
	KABYLE	ISA-KABYLE	
0-19 semaines (%)	13,04	9,63	NS
19-36 semaines (%)	24,00	15,00	*
36-51 semaines (%)	17,11	15,29	NS
51-66 semaines (%)	15,87	18,06	NS

Tableau 3 : Comparaison des deux types génétiques pour leur performances de ponte.

Paramètres	Génotype		P	R2
	KABYLE	ISA-KABYLE		
Poids à l'entrée de ponte	1334,05±15,26^a	1538,03±15,38^b	***	0,38
Age au premier œuf (j)	165,96±1,25^a	140,76±1,26^b	***	0,58
Nombre d'œufs /an	173,44±2,45^a	194,20±2,36^b	***	0,21

NB: sur la même ligne, les valeurs avec la même lettre ne présentent une différence très significative au seuil de P< 0,0001. ***: P<0,0001 ; ** : P<0,001 ; *: P<0,05; P≥0,05.

Conclusions et perspectives

La ponte de la poule Kabyle est supérieur aux 150 œufs par an exigé pour la rentabilité économique d'une race de poule. Les performances de ponte et la qualité des œufs de la poule Kabyle ont été améliorées par le croisement avec la souche Isa-Brown. Les actions envisagées devraient d'abord porter sur une évaluation et une conservation du patrimoine génétique aviaire local (constitution de noyaux de race pure, race Kabyle en particulier). Ensuite, un projet de développement rural basé sur l'exploitation commerciale des races aviaires locales sera mis en place. Des groupements villageois, plus particulièrement féminins, seront intégrés à un projet coopératif de sélection de la race pure (à but d'amélioration de la productivité des sujets de race locale tout en conservant leur rusticité, c'est-à-dire leur adéquation au milieu et mode d'élevage villageois). Ces groupements seraient en outre en charge d'un projet de croisements améliorateurs terminaux, afin de pourvoir en produits locaux de qualité supérieure les zones urbaines. Ce dernier aspect assurerait une production de haute valeur ajoutée en milieu rural, tandis que le volet sélection en race pure profiterait à l'ensemble des communautés villageoises par la distribution d'individus améliorés.

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Gestion des ressources génétiques animales par les éleveurs de dromadaires de la région d'Ansongo (Mali)

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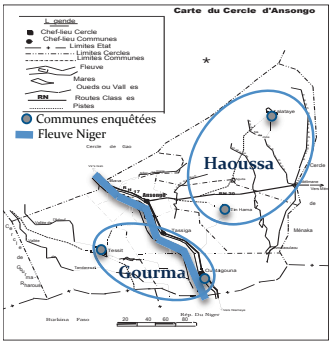
Contexte et objectif

Support de l'existence humaine au Sahel, les ressources génétiques animales seront au cœur des réponses des populations pastorales aux bouleversements climatiques et socio-économiques qu'affrontent leurs sociétés. Une vigilance quant à la gestion de ces ressources est cruciale en ce que les choix présents affectent les capacités futures d'adaptation. La connaissance limitée de la diversité au sein de l'espèce cameline est en outre un frein à sa mise en valeur pour un développement pastoral durable. En prélude à des évaluations morpho-biométriques et zootechniques, cette enquête vise à placer la diversité étudiée dans le cadre des pratiques, contraintes et objectifs des éleveurs qui en sont les gardiens.

Enquête

L'échantillon incluait 100 élevages répartis sur 4 communes de la région d'Ansongo, Mali. Deux communes, Tessit et Ouatagouna, étaient situées dans la zone du Gourma, proche du fleuve Niger, les deux autres, Tin Hama et Talataye, appartenant au Haoussa, plus aride. Les questions étaient centrées sur l'éleveur (socio-économique), le territoire (parcours, mobilité) et le troupeau (alimentation, santé, reproduction, races).



Résultats

Les pratiques de gestion étaient variables au sein de la région, bien que généralement marquées par la marginalisation ainsi qu'un faible soutien alimentaire et vétérinaire des troupeaux. Les déplacements étaient plus longs et variables dans le Haoussa. Les dromadaires étaient en voie de remplacement par les bovins au sein de la commune de Tessit, dans le Gourma. Le Tableau 1 présente les sept groupes d'éleveurs distingués au travers d'une analyse en composante principale. Les dénominations des types de dromadaires différaient entre le Haoussa, où les éleveurs distinguaient deux types sur base de leur conformation générale et des aptitudes productives, et le Gourma, où la classification se basait majoritairement sur les couleurs de robe (Tableaux 2). Les mâles reproducteurs étaient sélectionnés au sein du troupeau, le recours aux mâles extérieurs n'étant mentionné que par 15% des éleveurs. Les taux de citation des critères de sélection étaient similaires entre Haoussa et Gourma (Tableau 3), les plus cités étant la beauté et la production de lait.

Tableau 1 - Classification des éleveurs en sept groupes d'après une sélection de paramètres.

type	n	Principales caractéristiques d'élevage et de mobilité						
		Période du départ	Trajet	Cheptel	Compl. alim	Berger	Troupeau déplacé	Durée mobilité
1	8	Saison des Pluies	Fixe	>60	Aucune	Famille	entier	2 mois
2	22	variable	variable	40-60	Aucune	Famille	entier	> 2 mois
3	19	variable	Fixe	20-40	Résidus	Salarié	en partie	> 3 mois
4	15	variable	Fixe	40-60	Résidus	Famille	en partie	> 2 mois
5	19	variable	variable	40-60	Résidus/ tourteau	Famille /Salarié	entier	> 3 mois
6	7	Saison de Pluies	variable	10-60	Résidus	Famille /Salarié	entier	3 mois
7	10	Saison de Pluies	Fixe	>60	Résidus/ tourteau	Famille	en partie	> 3 mois

Tableau 2 - Types de dromadaires décrits et caractéristiques majeures.

	Nom local	Signe distinctif
Haoussa	Tilabayaten	élancé, laitier
Haoussa	Talmorokit	trapu, transport
Gourma	Emalli	Blanc
Gourma	Azargaf	Pie
Gourma	Azaref	Marron
Gourma	Akawal	Noir
Gourma	Abzaw	Gris sombre
Gourma	Ezagague	Rouge
Gourma	Awrague	Jaune
Gourma	Adignas	« Fiable »
Gourma	Awinague	Mauvaise vue

Discussion et Perspectives

Cette enquête illustre la variété des stratégies d'élevage pastoral et de leurs évolutions. La diversité des choix justifie et permet la diversité génétique. L'impact sur la biodiversité de l'abandon progressif du dromadaire dans certaines zones est toutefois à surveiller. L'étude montre en outre l'hétérogénéité des modes de classification des types camelins au sein d'une même région. Les faibles taux de citation des critères de sélection indiquent un faible partage des priorités d'amélioration, probablement en lien avec la polyvalence de l'animal. L'accord entre ces conceptions serait pourtant nécessaire dans l'optique de la mise en place de plans de sélection participatifs. La rareté des pratiques d'échange de mâles pourrait être une contrainte supplémentaire à cet égard. La variabilité des objectifs de sélection en fonction des stratégies de mobilité pourrait justifier des plans d'amélioration distincts. Afin de progresser sur cette voie, l'animation de groupes de discussion entre éleveurs au sein de et entre communes est à envisager. La connaissance acquise des modes d'élevage de dromadaires dans la région permettra la mise en place de suivis de la productivité des types génétiques en présence.

Tableau 3 - Critères de sélection déclarés dans le choix des reproducteurs (taux de citation en %)

	Haoussa		Gourma	
	Tin-Hama	Tala-taye	Tessit	Ouata-gouna
Beauté	25	20	35	30
Lait	23,5	30	21,5	25
Travail	19,5	21	17	18,5
Résistance	18	20	10	16
Vitesse	11,5	13	12	13,5

Selection criteria as used by owners-breeders of racehorses in Algeria

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INTRODUCTION

Characterized by positive externalities and the need to work on a large scale to be effective, animal breeding is most often carried out by organized structures of breeders or by states. In Algeria, the selective breeding of racehorses is in the hands of breeders-owners in isolation, in absence of organized breeding association. In the prospect of setting a national breeding scheme, this study aims at defining the practices of the owners-breeders of racehorses regarding animal selection in Algeria, with a special focus on the criteria guiding their breeding decisions. As both earnings and rankings can be used as selection criteria for racehorses, an additional aim was to highlight the relative importance of these objectives for owners-breeders.

MATERIALS AND METHODS

Main Survey: selection criteria and practices

A preliminary survey determined the selection criteria to be included in the questionnaire.

In males, the criteria were conformation, information sources considered to select stallions, price of insemination, and **in females**, the weakest racing performance, the occurence of diseases, the bad conformation of mares for the race. Particular practices were studied: age at first mating of mares and use of good performing mares for mating.

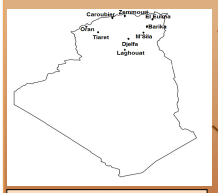


Figure 1 Location of racecourse across the Algerian territory

From 2009 to 2011, a survey was conducted in 9 racetracks

In situ sampling of owners-breeders

461 owners-breeders

177 professionals

The breeders were categorized according to their seniority in the sector. The regular practice of mating was used as a criteria to define the degree of professionalization (professionals and occasionals).

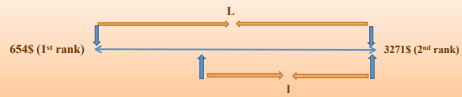
284 occasionals

Were made for class seniority and professionalization :
1-5 years and 6-10 years ⟶ Junior breeders
11-20 years and >20 years ⟶ Senior breeders

Objective: Ranking vs earnings

The second survey of type psychometric was realized between July and August, 2011. A sample of 60 owner-breeders among 177 professionals was randomly chosen.

The interviewee faced a virtual choice between a given earning at the first rank or a bigger earning at the second rank. They were then asked to determine how much they had to earn at the second rank to accept to give up the first rank. This amount reflected their preference for the ranking and was termed here **"ranking's value" (D).**



D = (l / L) * (3217$ - 654$)

Statistical analysis

The effects of seniority and professionalization of the owners-breeders on practices and selection criteria were studied by the **Chi-square test** (or exact **test of Fischer**). The effect of the seniority on the "ranking's value" was tested through the **test of Wilcoxon,** comparing medians between two groups (junior and senior professionals, respectively under and over 10-years experience).

RESULTS AND DISCUSSION

Rather than the degree of professionalization, seniority in the sector has shown an effect on practices and objectives of racehorses breeding (Table 1 and 2). The mating of mares early in their reproductive life was a more common practice for senior than for junior breeders ($p<0.01$). A wider array of information sources was considered by senior breeders for selecting stallions ($p<0.01$). Junior breeders granted a higher importance to the price of mating compared to senior breeders ($p<0.001$). Hence, senior breeders appeared to be more involved in selective breeding than junior breeders.

The Table 3 shows the medians of the "ranking's value" for the junior and senior professional breeders. This value was positive for both groups, the ranking being more important to junior professionals ($p<0.001$). This preference for ranking could be explained by the fact that the curriculum of the horse, rather than the race earnings themselves, form the basis of the breeder's income, raised through an activity of buying-racing-selling of horses.

Table 1 Effect of the seniority of the professionals and the occasional on the selection criteria of the stallions (in % of answers)

Criteria of selection	Professionals 1-5 (5)	6-10 (24)	11-20 (67)	>20 (81)	test	Occasional 1-5 (68)	6-10 (82)	11-20 (71)	>20 (63)	test
CF	80.0	91.7	94.0	95.1	ns	51.5	69.5	93.0	98.4	***
IND	60.0	75.0	79.1	86.4	ns	83.8	89.0	87.3	84.1	ns
ASC	100.0	87.5	100.0	98.8	*	82.3	85.4	98.6	100.0	***
DEC	80.0	70.8	91.0	97.5	***	79.4	70.7	95.8	95.2	***
COLL	0.0	29.2	58.2	64.2	***	19.1	24.4	56.3	60.3	***
PS	60.0	58.3	19.4	6.2	***	48.5	68.3	22.5	7.9	**

ns: $p>0.05$; *: $p<0.05$; **: $p<0.01$; ***: $p<0.001$

conformation (CF), individual performance (ND), ascending (ASC), progeny (DEC), siblings (COL), weakest racing performance (MP), occurence of diseases (PATH) , price of insemination (PS) , the bad conformation of mares for the race (CONFJUM), age at first mating of mares AGESAILLIE) and use of good performing mares for mating (JUMEFC).

Table 2 Effect of the seniority of the professionals and the occasional on the selection criteria of females (in % of answers)

Criteria of selection	Professionals 1-5 (5)	6-10 (24)	11-20 (67)	>20 (81)	test	Occasional 1-5 (68)	6-10 (82)	11-20 (71)	>20 (63)	test
MP	80.0	70.8	80.6	69.1	ns	72.1	61.0	70.4	79.4	ns
PATH	20.0	20.8	38.8	28.4	ns	25.0	21.9	22.5	27.0	ns
CONFJUM	60.0	45.8	61.2	62.9	ns	72.1	64.6	57.7	68.2	ns
AGESAILLIE	23.9	40.0	44.4	50.0	*	32.3	29.3	29.6	38.1	ns
JUMEFC	0.0	33.3	35.8	38.3	ns	29.4	30.5	29.6	30.2	ns

ns: $p>0.05$; *: $p<0.05$

Junior breeders

Senior breeders

Table 3 Comparison of "ranking value " (D) between the young and old owners-breeders

Seniority	N	D ($) Median	P-value
Youngs (1-10 years)	28	1613	***
Olds (>=11 years)	32	658	

*** : $p<0.001$

CONCLUSIONS

The selection criteria used by owners-breeders in Algeria proved to be highly subjective and poorly informed. The selection practices were mostly inappropriate. However, an interest for selective breeding is noticed as well as a willingness to enroll in well-organized breeding scheme through a participatory process. Such a process would have to take account of differences that are observed here between senior and junior breeders.

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Evaluation of the non-genetic factors of the racing performances of Arabian horses in Algeria

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1. INTRODUCTION

Flat racing in Algeria is a national tradition, which today needs to become more organized to stick to international standards and to face the laws of international competition. In Algeria, no selection program has been put in place and no assessment of the genetic additive value of breeding animals based on the performance of horses has been carried out till now despite the availability of reliable performance data. Various objective quantitative measures of earnings and of rankings will be described in this study. The raw measures are supposed to reflect not only the genetic potential of the horses but also the environmental conditions (non-genetic factors) in which these observations have been made. Numerous studies have shown that these non-genetic factors strongly influenced the earnings and ranking of horses in flat-racing (Belhajyahia et al., 2003; Ekiz and Kocak, 2005). In order to be able to estimate the genetic potential (breeding value) of the individuals, it is therefore important to determine the part played by the environment in the performances in the Algerian conditions.

2. OBJECTIVES

The objectif this study is devoted on one hand to the estimation of phenotypic correlations between the used traits, in order to deduce what is common between these different performance measures and what is specific to each measure, and on the other, to the estimation of the impact of non-genetic factors such as sex, age, year of performance and their interactions.

Race in the racecourse of Tiaret

3. MATERIALS AND METHODS

3.1. Performances database

SCHPM

Results of gallop races for 13 years : 1995 to 2007
913 horses in 3086 races

information on the race (date of the race, the final rankings, the earnings and racing horses)

information relative to each horse involved in a race (name, sire, dam, age, sex and gender),

36492 results

3.2. The used traits

Of synthetic variables have been calculated for each horse after logarithmic transformation (for the earnings) and *performance rate* (for the ranks):

- Log annual virtual earning (LAEV: total sum won per year),

-Log the average annual virtual earning per start (LAEV/S: total sum won per year/ the total number of starts in the year),

- The annual ranking (average annual ranking: PERF).

3.3. Statistical analysis

To analyze the effect of non-genetic factors, a linear fixed effects model was adjusted to the data and analyzed with the General Linear Models (GLM) procedure. The correlations between the three performance traits (LAEV, LAEV/S, and PERF) were obtained using the CORR procedure of SAS software.

The mathematical model used

$$Y_{ijkn} = \mu + S_i + Ag_j + An_k + S_i * Ag_j + S_i * An_k + Ag_j * An_k + e_{ijkn}$$

Where, Y_{ijkn} = LAEV, or LAEV/S or PERF of the n^{th} horse of sex i, of age class j, in the race year k; μ= general average; S_i= fixed effect of the sex i (classes F and M); Agj= fixed effect of the age j (6 classes: 3, 4, 5, 6, 7 and >= 8 years); Ank= fixed effect of the race year k (13 years: from 1995 to 2007); Ai*Bj = interaction between the levels i of the effect A and j of the effect B; eijkn= residual random Effect.

4. RESULTS AND DISCUSSION

4.1. Effect of the non-genetic parameters on the different traits

The results of the analyses presented in Table 1 show significant effect (p<0.001) of sex, age and year of race for LAEV, LAEV/S and PERF. An interaction between the age and year of the race is significant, an interaction between age and sex is significant only for the PERF trait. These results confirm those obtained by Belhajyahia et al. (2003).

Table 1 Effect of the fixed factors and their interactions on LAEV, LAEV / S and PERF to the Arabian horses

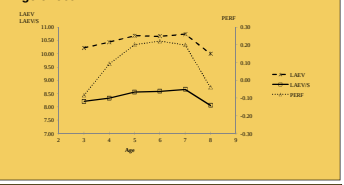
	Arabian horse (N=3611)					
	LAEV		LAEV/S		PERF	
Fixed effects	P-value	R^2_+	P-value	R^2_+	P-value	R^2_+
Sex	***	0.02	***	0.03	***	0.05
Age	***	0.02	***	0.02	***	0.03
Year of the race	***	0.01	***	0.02	***	0.01
R^2(model without interactions)		**0.05**		**0.07**		**0.09**
Sex x age	ns		ns		*	0.003
Age x year of the race	***	0.03	***	0.03	***	0.04
Sex x year of the race	ns		ns		ns	
R^2(model with interactions)		**0.08**		**0.10**		**0.13**

ns : $p>0.05$; * : $p<0.05$; *** : $p<0.001$

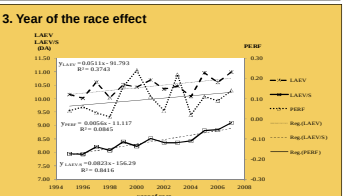
$_+$: Only the values of R^2 for the significant effects are represented in the table

1. Sex effect
The superiority of the males over the females (p<0.05) can be observed for LAEV, LAEV/S and PERF.

2. Age effect



3. Year of the race effect



4.2. Correlations between LAEV, LAEV/S and PERF

The high observed correlations (Table 2) confirm the results obtained by Belhajyahia et al. (2003). Although the correlations between the traits are high, each trait reveals a different facet of the quality of a horse. The interest in using several traits is to take these various aspects into account.

Table 2 Coefficient of correlation (r) between three traits

	LAEV	LAEV/S	PERF
LAEV	/		
LAEV/S	0.93***	/	
PERF	0.76***	0.81***	/

***: $p<0.001$

5. CONCLUSIONS

The results of correlations found between the three traits show that, overall, they take account of similar aptitudes which justifies the use of multiple traits to correctly define all the facets of the racing performances of the horse. This study on racing has shown the significant effect of non-genetic factors such as sex, age, year of the race and the interactions between these factors, on the earnings traits (LAEV and LAEV/S) and ranking value (PERF). The demonstrated effects of the non-genetic factors indicate the need to adjust the earnings and ranks in the context of a program for genetic improvement of horses in Algeria.

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Arabian horse in the stud farm of Tiaret

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Contribution to genetic methods of mapping using non-parametric statistical

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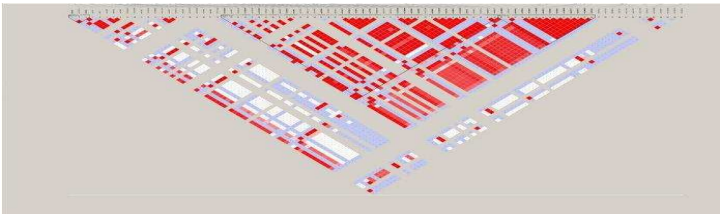
Introduction

These last years have seen the emergence of a wealth of biological information. Facilitated access to the genome sequence, along with massive data on genes expression and on proteins have revolutionized the research in many fields of biology. This continuous flow of information has led to a situation where data management and use have become a challenge, and where new statistical methodologies and algorithms are needed in order to take full advantage of these new technologies.

Objectives

Our goal in this work is to develop statistical procedures allowing a better detection of relationship between genomic configuration and phenotypic expression by taking into account interaction effects while keeping power high by controlling for the complexity of the model.



Context and problem

In parallel to these technical improvements, methodological advances are needed to address the various questions of scientific interest. One such question concerns the exact relationship between genomic configuration and phenotypic expression. The main idea is to identify variants at the molecular level and to try to associate these variations at the molecular level to observed variations at the macroscopic level.
This context induces two challenges:

1- The genetics underlying most traits of interest is complex and involves most of the time many genes and many interactions between these genes, leading to a complex relationship between changes at the gene level (genomic variants) and phenotypes. So identification of every (or even of any) variants is a very challenging task.
2- From a more statistical point of view, fully modeling this complexity leads to models with more parameters than what can reasonably be identified with available cohorts sizes and affordable prices.

Material and Methods

To study the relationship between the studied phenotype and the underlying genetics, we propose a semi-parametric model. The method is based on the regression of the trait of interest on a nonparametric smooth function of single nucleotide polymorphisms (SNP) genotypes in the tested region, while taking into account the parametric effects of all other covariates of interest.

$$\mathbf{Y_i = X_i\beta + h(G_i) + e_i}$$

$\mathbf{Y_i}$ Represents the value of the studied trait for individual i,

$\boldsymbol{\beta}$ Is a vector of environmental (i.e. non-genetic) additive contributions to the trait,

$\mathbf{X_i}$ Is an incidence vector linking the observation made on individual i to the environmental factors affecting that measurement,

e_i Is a residual term for individual i, and $h(G_i)$ Is a nonparametric function of the genotype data for individual i.

A key point is that the non-parametric function can be written $h(G_i) = \sum_{j=1}^{n} \gamma_j * K(G_i, G_j)$

where $K(G_i, G_j)$ is a "kernel" function. Using various kernels allows contrasting situations with various levels of interactions while necessitating few parameters to be specified.

Results

Software has been developed allowing testing various scenarios of interactions. A comparison will be made with other available packages, and the method will also be used to reexamine real datasets in order to potentially illuminate new regions of interest.

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