Supplemental material for:

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Supplemental Material 1

Résumé

À travers l'Afrique, les ressources zoogénétiques (AnGR) constituent un pilier de la sécurité alimentaire, des économies rurales et du patrimoine culturel. Pourtant, les politiques visant leur gestion durable demeurent fragmentées ou inexistantes dans la plupart des pays. S'appuyant sur une analyse comparative des politiques de 40 contextes nationaux réalisée dans le cadre du projet du Bureau Interafricain des Ressources Animales de l'Union Africaine (UA-BIRA) (2013-2018), ainsi que sur des études de cas comparatives menées en Ouganda, en Afrique du Sud, en Éthiopie, au Kenya, au Ghana et au Mali, cet article met en évidence des contraintes structurelles récurrentes associées à cette lacune de gouvernance. Contrairement à l'hypothèse d'une simple apathie politique, ce déficit persiste malgré l'adhésion généralisée à des cadres internationaux tels que le Protocole de Nagoya et le Plan d'action mondial. L'analyse des données examinées révèle cinq contraintes interdépendantes. Premièrement, les ressources zoogénétiques sont généralement intégrées à des mandats agricoles plus larges, ce qui conduit à des législations vagues et peu spécifiques. Deuxièmement, les responsabilités institutionnelles sont fragmentées entre plusieurs organismes insuffisamment coordonnés. Troisièmement, les infrastructures essentielles de données demeurent sous-développées. Quatrièmement, les insuffisances chroniques de financement et de capacités techniques entravent la mise en œuvre des politiques. Enfin, les communautés d'éleveurs sont systématiquement exclues des processus d'élaboration des politiques. Bien que des initiatives continentales, telles que les points focaux sous-régionaux, aient favorisé la coordination régionale, elles n'ont pas permis de susciter une action nationale durable. Pour combler ce déficit de mise en œuvre, nous proposons une stratégie de réforme à double volet: l'adoption d'une législation nationale spécifique aux ressources zoogénétiques et la mise en place de cadres de gouvernance participatifs plaçant les pasteurs et les petits exploitants agricoles au cœur des efforts de conservation et d'utilisation durable. En identifiant les obstacles systémiques et en contextualisant les trajectoires de réforme propres à chaque pays, cette analyse propose des pistes de réforme adaptées aux contextes nationaux afin de renforcer la gouvernance des ressources zoogénétiques en Afrique.

Mots-clés : politique relative aux ressources zoogénétiques; gouvernance de la biodiversité; fragmentation institutionnelle ; races de bétail africaines ; communautés pastorales et d'éleveurs.

Supplemental Material 2. Questionnaire Directorate of Animal Production. The state of Animal Genetic Resources in Africa

AFRICAN UNION
INTERAFRICAN BUREAU FOR ANIMAL RESOURCES

Strengthening the Capacity of African Countries to Conservation and Sustainable Utilization of African Animal Genetic Resources

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Questionnaire
Directorate of Animal Production

The state of Animal Genetic Resources in Africa

The state of use of breeds by species

1. How many breeds of each species are being used by local farmers?

    a. List the breeds and indicate if they are local or exotic breeds.

Species	List of breeds	Local *Mark the boxes*	Exotic *Mark the boxes*
Cattle	1		
	2		
	3		
	4		
	5		
Sheep	1		
	2		
	3		
	4		
	5		
Goats	1		
	2		
	3		
	4		
	5		
Pig	1		
	2		
	3		
	4		
	5		
Camel	1		
	2		

	3		
	4		
	5		
Poultry	1		
	2		
	3		
	4		
	5		
Others ……..	1		
	2		
	3		
	4		
	5		

b. Indicate the past and current population sizes of the listed breeds.

Species	List of breeds	2005	2010	2015
Cattle	1			
	2			
	3			
	4			
	5			
Sheep	1			
	2			
	3			
	4			
	5			
Goats	1			
	2			
	3			
	4			
	5			
Pig	1			
	2			
	3			
	4			
	5			
Camel	1			
	2			
	3			
	4			
	5			
Poultry	1			
	2			
	3			
	4			
	5			
Others ……..	1			
	2			
	3			
	4			
	5			

c. Are there locally Adapted breeds in your country that are considered to have unique characteristics?

Yes		No	

If yes fill the table below:

Species	List of breeds	Characteristics
Cattle	1	
	2	
	3	
	4	
	5	
Sheep	1	
	2	
	3	
	4	
	5	
Goats	1	
	2	
	3	
	4	
	5	
Pig	1	
	2	
	3	
	4	
	5	
Camel	1	
	2	
	3	
	4	
	5	
Poultry	1	
	2	
	3	
	4	
	5	
Others ……..	1	
	2	
	3	
	4	
	5	

d. Are there opportunities for sale or exchange of these breeds, or for more widespread use outside your country?

e. In your view and from available information, which breeds are threatened, at risk of extinction or in need of conservation initiatives?

Species	**List of breeds**	**Threatened** *Mark the boxes*	**Risk of extinction** *Mark the boxes*	**In need of conservation initiatives**
Cattle	1			
	2			
	3			
	4			
	5			
Sheep	1			
	2			
	3			
	4			
	5			
Goats	1			
	2			
	3			
	4			
	5			
Pig	1			
	2			
	3			
	4			
	5			
Camel	1			
	2			
	3			
	4			
	5			
Poultry	1			
	2			
	3			
	4			
	5			
Others ……..	1			
	2			
	3			
	4			
	5			

f. Indicate their primary contribution to socio-economic development.

Primary contribution	**Cattle** *Mark the boxes*	**Sheep** *Mark the boxes*	**Goat** *Mark the boxes*	**Pig** *Mark the boxes*	**Camel** *Mark the boxes*	**Poultry** *Mark the boxes*	**Other** *Mark the boxes*
Supporting the livelihoods of poor farmers							
Supporting the livelihoods of consumers							
Supporting the livelihoods of traders							
Supporting the livelihoods of laborers							
Food-insecurity							
Animal traction							
Conservation of endangered AnGR							
Better income							
Increased well – being							
Reduced vulnerability							
More sustainable use of natural resource base							
Empowerment							
Social inclusion							
Cultural values							
Research							
Other ……							

g. List primary threats associated to loss of breeds numbers or diversity in your country.

Primary threats	*Mark the boxes*
Crossbreeding with more productive breeds	
Export of animals	
Policy issues	
Conflicts and disorders	
Disease outbreaks	
Conservation programmes lacking	
Rising demand for specific livestock products	
Climate change	
Value of many animal genetic resources poorly understood	
Urbanization	
Intensification of agriculture	
Global marketing of exotic breeding material	
Natural disasters (drought, famine)	
Lack of functional institutions e.g. breed societies etc	
Lack of reproductive technologies (AI etc)	
Other ……	

h. For each breed of each species, what is the distribution of the breeds within the country?

Species	**List of breeds**	**Geographical distribution**
Cattle	1	
	2	
	3	

	4	
	5	
Sheep	1	
	2	
	3	
	4	
	5	
Goats	1	
	2	
	3	
	4	
	5	
Pig	1	
	2	
	3	
	4	
	5	
Camel	1	
	2	
	3	
	4	
	5	
Poultry	1	
	2	
	3	
	4	
	5	
Others ……..	1	
	2	
	3	
	4	
	5	

2. What are the breeds of each species being actively developed within the country?

		Programs		
Species	**List of breeds**	**Genetic improvement** *Mark the boxes*	**Conservation** *Mark the boxes*	**Crossbreeding** *Mark the boxes*
Cattle	1			
	2			
	3			
	4			
	5			
Sheep	1			
	2			
	3			
	4			
	5			
Goats	1			
	2			
	3			
	4			

	5			
Pig	1			
	2			
	3			
	4			
	5			
Camel	1			
	2			
	3			
	4			
	5			
Poultry	1			
	2			
	3			
	4			
	5			
Others ……..	1			
	2			
	3			
	4			
	5			

3. Has your country made significant investments and undertaken initiatives to import and use exotic AnGR?

Level of investment	*Mark the boxes*
Investments very significant	
Investments significant	
Investments not significant	
No investments	

4. What have been the results and impacts of these initiatives?

Policies and Legislations

5. Are there any policies and legal instruments that affect the use of AnGR in your country?

Yes		No	

If yes, please provide the soft copies of documents on these.

6. Do these policies/legislations discriminate between the available breeds and species within the country, and those imported from other countries?

Yes		No	

How?

7. Are there policies and legislation, in your country, that support and promote the conservation and use of indigenous AnGR?

Yes		No	

8. Are there policies and legislation, in your country, that support and promote technologies on the use of particular AnGR? (for examples, Artificial Insemination, Embryo transfer, etc…) Please provide the soft copies of documents on these

Yes		No	

9. Are there policies and legislation, in your country, that support and promote the use of indigenous knowledge and practices relevant to AnGR? Please provide the soft copies of documents on these

Yes		No	

10. Is indigenous knowledge, in your country, considered in designing and implementing policies that affect AnGR?

Yes		No	

11. Are there policies or legal instruments, in your country, that support and promote sharing of benefits derived from the use of AnGR? Describe how these work. Please provide the soft copies of documents on these

Yes		No	

12. Are there legislation and policies governing access to AnGR? Please provide the soft copies of documents on these

Yes		No	

13. Based on the main production systems in your country, list down the key issues/constraints that affect production, management and effective utilization of AnGR.

Production system	Key issues/constraints

14. What are the gaps in the development and implementation of these AnGR policies and legal instruments

15. Are there any species-specific policies and legal instruments affecting the development of AnGR?

Yes		No	

List these species-specific policies and legal instruments

Policy/legal instruments	**Objectives**	**Comments**

16. Are there policies and legislation that support the establishment of institutional mechanisms that enable the development of AnGR? Please provide the soft copies of documents on these

Yes		No	

17. Are there AnGR breeders and/or farmers organizations organized in your country?

Yes		No	

What are the structures of these organizations? Please provide the soft copies of documents on these.

18. Are there any coordinating mechanisms on AnGR and conservation objectives and initiatives?

Yes		No	

Do these facilitate or inhibit the use of AnGR in your country?

Yes		No	

19. Please provide 3 or 4 best practices and lessons learnt on AnGR policy development and implementation in your country.

1
2
3
4

Breeding and conservation

20. For each species in each system, what is the relative use of each of the three breed groups?

Production system……

Species	**Locally adapted breeds** *Mark the boxes*	**Recently introduced** *Mark the boxes*	**Continually introduced or combinations** *Mark the boxes*
Cattle			
Sheep			
Goats			
Pig			
Camel			
Poultry			
Others			

Production system……

Species	**Locally adapted breeds** *Mark the boxes*	**Recently introduced** *Mark the boxes*	**Continually introduced or combinations** *Mark the boxes*
Cattle			
Sheep			
Goats			
Pig			
Camel			

Poultry			
Others			

Production system……

Species	Locally adapted breeds *Mark the boxes*	Recently introduced *Mark the boxes*	Continually introduced or combinations *Mark the boxes*
Cattle			
Sheep			
Goats			
Pig			
Camel			
Poultry			
Others			

Production system……

Species	Locally adapted breeds *Mark the boxes*	Recently introduced *Mark the boxes*	Continually introduced or combinations *Mark the boxes*
Cattle			
Sheep			
Goats			
Pig			
Camel			
Poultry			
Others			

Production system……

Species	Locally adapted breeds *Mark the boxes*	Recently introduced *Mark the boxes*	Continually introduced or combinations *Mark the boxes*
Cattle			
Sheep			
Goats			
Pig			
Camel			
Poultry			
Others			

Production system……

Species	Locally adapted breeds *Mark the boxes*	Recently introduced *Mark the boxes*	Continually introduced or combinations *Mark the boxes*
Cattle			
Sheep			
Goats			
Pig			
Camel			
Poultry			
Others			

21. What are the breeding structures that are commonly used in your country?

Species	List of breeds	Programs		
		Straight-breeding *Mark the boxes*	**Unstructured breeding** *Mark the boxes*	**Crossbreeding** *Mark the boxes*
Cattle	1			
	2			
	3			
	4			
	5			
Sheep	1			
	2			
	3			
	4			
	5			
Goats	1			
	2			
	3			
	4			
	5			
Pig	1			
	2			
	3			
	4			
	5			
Camel	1			
	2			
	3			
	4			
	5			
Poultry	1			
	2			
	3			
	4			
	5			
Others ……..	1			
	2			
	3			
	4			
	5			

22. Are there any breeding programmes in your country? What are the general breeding goals, breeding strategies and tools used for evaluation and selection of male/female animals for breeding?

Species	Name of the Breeding program	General breeding goals	Breeding strategies
Cattle			

Sheep			
Goats			
Pig			
Camel			
Poultry			
Others			

23. What are the main reasons for crossbreeding for the various species?

Species	Reasons	Period
Cattle		
Sheep		
Goats		
Pig		
Camel		
Poultry		
Others		

24. Are there any noticeable impacts of crossbreeding (positive or negative)?

25. If a program has been discontinued what were the reasons? Why were they discontinued?

Program	Live spam (duration)	Reason for discontinuity

26. Are there any performance recording schemes for each species and breeds?

Yes		No	

What are the main reasons?

Reasons

27. How do farmers benefit from the recording schemes?

28. Who is responsible for the performance recording being carried out for each species?

Responsible	*Mark the boxes*
Farmers	
Sub-national governments	
National government	
Co-operatives	
Breeding organizations	
Private companies	
Others	

29. Is there a central database in place to collate all the records?

Yes		No	

Who manages this?

30. Please describe the current state of characterization in your country.

Species	Method *Mark the boxes*						
	1	2	3	4	5	6	7
Cattle							
Sheep							
Goats							
Pig							
Camel							
Poultry							
Others							

1= Basic breed surveys
2 = Advanced breed surveys
3 = Quantitative
4 = Molecular
5 = Economic Valuation
6 = monitoring and early warning
7 = evaluation of breeds and crosses for use in particular production systems

31. What progress has been made in characterization of breeds in the past 10 to 20 years?

32. What are the strategies for maintaining and developing your locally Adapted Breeds for each species and each major production system?

Species	Production system	Strategy

Cattle		
Sheep		
Goats		
Pig		
Camel		
Poultry		
Others		

33. Does your country have conservation strategies or action plans for AnGR?

Yes		No	

If not, why?

34. Where applicable, how were the conservation priorities established?

35. What are the strengths and weaknesses of these strategies/action plans?

Strengths	Weaknesses

36. Are there collections and storage programmes (genebanks) in your country for genetic materials for breeds that are not at risk?

Yes		No	

37. What are the objectives and methodology for sampling for these programmes?

38. How and where is the data and information on this material stored?

39. What other conservation programmes (by species/technique) are used? Indicate the objectives, activities and any achievements so far.

Species	Conservation method/technique	Objectives	Since when?	Comments
Cattle				
Sheep				
Goats				
Pig				
Camel				
Poultry				
Others				

40. Are there any breed conservation incentives in place in your country?

Yes		No	

41. If yes, what breed conservation incentives are in place?

42. Is the private sector playing a role in AnGR conservation?

Yes		No	

If no, how can their participation be promoted?

43. What impacts, have conservation programmes had on agricultural production and food security in your country?

44. What are the main constraints, challenges and opportunities in implementing conservation programmes within the country?

Program	Constraints	Challenges	Opportunities

45. Please provide 3 or 4 best practices and lessons learnt on AnGR breeding and conservation in your country.

1
2
3
4

Institutions

46. What institutions are involved for each species in the development of AnGR?

Species	Government *Mark the boxes*	Livestock keepers *Mark the boxes*	Breeders Associations *Mark the boxes*	Commercial companies *Mark the boxes*	NGO's *Mark the boxes*	Others *Mark the boxes*
Cattle						
Sheep						
Goats						
Pig						
Camel						
Poultry						
Others						

47. What are the linkages among various institutions?

48. What is the level of collaboration

Good		Medium		Poor	

49. How do private and the public sectors contribute to the organization of straight-breeding programmes for each species?

Species	**Farmers, farmer associations, breeders, and other commercial interests** *Mark the boxes*	**Government** *Mark the boxes*
Cattle		
Sheep		
Goats		
Pig		
Camel		
Poultry		
Others		

50. How are farmers, farmer associations, breeders, and other commercial interests involved in the acquisition and use of improved breeding stock in your country?

Awareness and communication

51. What is your country's strategy for enhancing its information and communication system's capacity to support and promote the better management of AnGR, including preserving indigenous knowledge, monitoring and reporting on the state of these resources, trends and threats?

52. What are the priorities for enhancing public understanding/knowledge and awareness of the roles and values of AnGR and the need for sustainable development, utilization and conservation of these resources?

53. What are the obstacles to, and opportunities for improving public understanding/knowledge and awareness?

54. Are the role and value as well as conservation of indigenous AnGR generally recognized in your country?

Yes		No	

55. What are the channels of communication between conservation organizations and the government?

56. What action should be taken at regional level to ensure the conservation of AnGR?

57. Best practices and lessons learnt