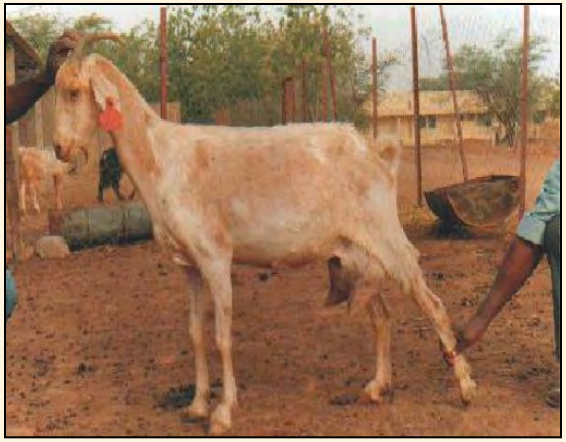
Scope of Animal biotechnology Application and Challenges for Sub-Saharan Africa

Adama Traore, CNRA-MALI

CHALLENGES TO MEET

- ✓ Increased food production and poverty reduction (contribution of livestock is crucial);
- ✓ Help reduce the dependence of Sub - Saharan Africa on livestock product (Meat and milk product!);
- ✓ Make a better use of the opportunities of both conventional and modern Biotechnologies (animal reproduction - animal health – animal nutrition etc.);
- ✓ Make it profitable for the poor!

OVERVIEW OF AVAILABLE BIOTECHNOLOGIES WITH POTENTIAL APPLICATION IN AFRICA
ANIMAL GENETICS AND BREEDING



Artificial insemination

AI can increase the rate of genetic improvement - reduce transmission of venereal diseases - minimize the cost of introducing improved stock.

However, success of AI depends on **accurate heat detection** and timely insemination, **semen conservation**, **good animal husbandry** (Nutrition and Health) and **demand driven (**link to National genetic improvement programme)

Only few countries have used AI more widely : South Africa, Kenya and Zimbabwe; others few countries have taken the technology to the field : Botswana, Ethiopia, Ghana, Malawi, Mali, Nigeria, Senegal and Sudan. Most of them have used AI in relation with **crossbreeding using exotic cattle breeds.**

OVERVIEW OF AVAILABLE BIOTECHNOLOGIES WITH POTENTIAL APPLICATION IN AFRICA

Embryo transfer (ET)

Increase the **reproductive rate of selected females** : use of genetically outstanding female;

Multiple ovulation embryo transfer (MOET) : composite technology of estrus synchronization – superovulation – fertilization/in vitro fertilization (IVF) - embryo freezing and embryo transfer; it can also integrate **Embryo sexing and cloning**.

Embryo transfer is not widely used in Africa, mainly due to limited facilities and infrastructure.

OVERVIEW OF AVAILABLE BIOTECHNOLOGIES WITH POTENTIAL APPLICATION IN AFRICA ANIMAL GENETICS AND BREEDING

Cryopreservation of semen, ova and embryos

✓ Developing and **utilizing a genetic resource** is considered the most rational conservation strategy. However, there are cases where ex-situ approaches are the only alternatives.

✓ ***Ex-situ* approaches include**: maintenance of small populations in domestic animal zoos; cryopreservation of semen (and ova); cryopreservation of embryos.

✓ **Conservation of indigenous animal genetic resources** should be one of the priority livestock development in Africa.

✓ **Financial support to implement conservation programmes is missing.**

Overview of available biotechnologies with potential application in Africa

ANIMAL HEALTH

Disease diagnosis / Vaccine Production

✓ Highly specific antigens by **recombinant DNA techniques** have the capacity to differentiate between immune responses generated by vaccination from those due to infection.

✓ Through the use of monoclonal antibodies and recombinant DNA technologies, it is now possible to produce **immunogenic components** superior to conventional vaccine with **regard to efficacy, safety, stability and cost**.

✓ To date many vaccines have been produced by these techniques : **thermostable recombinant vaccine against PPR, capripox-PPCB vaccine, thermotolérant vaccines for Newcastle Disease**

Overview of available biotechnologies with potential application in Africa

ANIMAL NUTRITION

Biotechnological options are available for improving rumen fermentation and enhancing the nutritive value and utilization of agro-industrial by-products and other forages:

- ✓ **Improving nutritive value of cereals;**
- ✓ **removing anti- nutritive factors from feeds;**
- ✓ **improving rumen function.**

These technologies are far less exploited in Africa.

Development of transgenic bacteria with **enhanced cellulosic activity**, reduced methane production capability, increased capability for nitrogen "fixation" .

Looking Forward - Preparing for the Future

❖Considerations regarding adoption of biotech.:

✓ Biotechnologies should build **upon existing conventional technologies;**

✓ Biotechnologies should be **integrated within the framework of a national livestock development production;**

✓Biotechnologies should be **Technically, economically and socially affordable;**

❖Policy and institutional considerations

✓Adoption of enabling policies;

✓Biosafty regulation;

✓IPR ;

Looking Forward - Preparing for the Future

❖ Consideration on capacity building

In sub-Saharan Africa (excluding **South Africa**), only **ILRI** (based in Kenya), and **CIRDES** (based in Burkina) are actively **involved in livestock biotechnology research.**

Africa lack on well-equipped laboratories and qualified human resources; Beca hosted by ILRI **is the only well- equiped Lab**. in the region but serving principally the East African region. It give a need for a **similar Lab. in the West African Region.**

It is important that Africa **develop capacity to maintain a strong base of applied and adaptive research** and some level of training to keep abreast with **new developments**

Thank you
Merci