

REPUBLIC OF RWANDA

MINISTRY OF AGRICULTURE AND ANIMAL RESOURCES



PO Box 621- Kigali; Tél/Fax: 584644-585008

**PLAN STRATEGIQUE DE TRANSFORMATION DE L'AGRICULTURE AU
RWANDA**

ANIMAL PRODUCTION SUB-SECTOR

By Dr BUTERA Jean-Bosco & Dr RUTAGWENDA Theogen, Consultants

**Under coordination of Groupe d'Expertise, de Conseil et d'Appui au Développement
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LIST OF ABBREVIATIONS

AI	Artificial Insemination
ARMV	Association Rwandaise de Médecine Vétérinaire
BNR	Banque Nationale du Rwanda
BRD	Banque de Développement du Rwanda
CNIA	Centre National d'Insémination Artificielle
COMESA	Common Market for Eastern and Southern Africa
FAO	Food And Agricultural Organization
GOR	Government of Rwanda
HIV/AIDS	Human Immuno Deficiency Virus / Acquired Immuno Deficiency Syndrome
LVNR	Laboratoire Vétérinaire National du Rwanda
MINAGRI	Ministry of Agriculture and Animal Resources
MINALOC	Ministry of Local Government
MINECOFIN	Ministry of Finance and Economic Planning
MINICOM	Ministry of Commerce, Industry and Investment Promotion
MINISANTE	Ministry of Health
PADEBEL	Projet d'Appui au Développement de l'Elevage Bovin Laitier
RSSP	Rural Sector Support Project

EXECUTIVE SUMMARY

The Government of Rwanda recently adopted key policies namely Vision 2020 and the Poverty Reduction Policy that will foster development for the next 2 decades. One of the pillars of the vision is the transformation from subsistence to a productive, high value, market-oriented Agriculture that has an impact on other economic activities. In this context, the Ministry of Agriculture proposed an agricultural policy which will evolve around four strategic axes, namely:

- (i) The modernization and transformation of Agriculture.
- (ii) The development of important commodities
- (iii) Competitiveness of the products on the market.
- (iv) High entrepreneurship capacity of the farmers.

The overall goal for the policy is to contribute to poverty alleviation by ensuring food security and generation of income for farmers which should be achieved through an increase in production without endangering the environment. In Rwanda Agriculture contributes to 40% of GDP with livestock contributing 8.8 %. The current livestock population consists of 991.697 cattle, 1.270.903 goats, 371.766 sheep, 211.918 pigs, 2.482.124 chicken and 498.401 rabbits and the level of animal products in tons is as follows; milk 97.981, meat 39.126, eggs 2.432, fish 7.612 and hides and skins 1.499.

According to FAO, the minimum per capita annual requirement for milk is 220 litres, while that of meat is 50 kgs. However, the current consumption in Rwanda stands at 12 litres of milk and 4.8 kg of meat per capita per year. The aim of this paper is to analyse the current status of animal production in the country, identify constraints and opportunities, suggest strategies and propose programmes for overcoming the constraints.

1. Constraints to animal production

Animal production in Rwanda is faced with several constraints which include;

1. Poor animal nutrition, both quantity and quality as a result of shortage of farming land, insufficient and non controlled commercial feeds, limited use of agricultural by-products and unreliable water availability.
2. Animal diseases including zoonoses that lower productivity
3. Poor performing local breeds that form a big fraction of the animal species.
4. Weak veterinary services delivery as a result of few cadres of service providers in the livestock industry in the country including Veterinary Doctors, Assistants and Artificial Insemination technicians.
5. Poor investment in livestock industry. Livestock farming especially among pastoralists is usually done with minimum inputs. Few organizations invest in livestock because of long periods which are needed to realise profits.
6. Inaccessibility of credit to small scale farmers. This hinders the adoption of improved farming technologies by the farmers.
7. Inadequate linkage between research and extension to farmers. Until now, research has been conducted mostly in research stations without much impact on farming communities.

8. Weak farmers organisations. There are a few farmers associations in the rural areas and these are usually small with low human and financial resources as well as organisational capacity.
9. Limited diversification of animal husbandry. Livestock production has in the past emphasized cattle keeping ahead of other animals and yet the reproductive cycle is shorter for other animals in addition to the advantages of integration.

2. Opportunities for animal production

There are several opportunities for supporting animal production and these include:

1. Decentralisation policy. The Government of Rwanda has adopted a decentralization policy aiming at bringing services close to the population. According to this policy, Umurenge will be the focal unit for development. The veterinary services will improve if staff are deployed at umurenge level especially in districts whose main economic activity is livestock.
2. A new land policy. A new land policy is being drafted which will give security of tenure as currently more than 50% of livestock husbandry is done on state and leased land. This will encourage investment in farming.
3. Review of laws related to Animal health. The Government is currently reviewing laws related to animal husbandry to make them rhythm with the present times.
4. Strengthening of the veterinary profession. The veterinary profession in Rwanda through the Veterinary Association (ARMV) is being streamlined so that it plays a more significant role in veterinary service delivery and other aspects of animal husbandry.
5. Availability of credit facility to farmers. The Development Bank of Rwanda (BRD) and other projects like RSSP and PADEBEL have been giving loan facilities to farmers wishing to import exotic animals from outside the country. This importation will improve the genetic germplasm and animal productivity in the country.

3. Strategies for developing animal production sub sector

Six strategies have been identified:

1. Decentralisation of service delivery to Umurenge level with appropriate human capacity and deployment in areas with livestock activities will improve delivery of veterinary services.
2. Encouragement of the formation of a national farmers association (union) and promoting multi-species systems will speed the transformation of agriculture.
3. Creating an enabling environment for private investment in livestock industry including microfinance will encourage modern farming and processing.
4. Improving Animal Health through capacity building for service providers and strengthening the National Veterinary laboratory will boost animal production.
5. Improving the performance of local breeds by strengthening the CNIA and the national hatchery, the feeding base of the animals by improvement of pastures and water provision will increase animal production.
6. Increasing the linkage between training, research and extension to farmers in order to equip farmers with improving farming methods. .

4. Cross cutting issues in animal production

1. Land degradation. There are various degrees of land degradation in the farming areas.
2. Coordination: There is a lot of coordination needed between MINAGRI and other actors especially during policy formulation and implementation like disease control.

5. Proposed programmes for improving animal production

There are several programmes which are proposed according to animal products:

Milk production:

- ✓ Identify major and potential milk areas.
- ✓ Improve capacity of service providers through training
- ✓ Strengthen and promote the use of AI and ET

Meat production:

- ✓ Encourage rearing and use of goats and pigs in meat production

Production of eggs:

- ✓ Promote the National hatchery

Quality control:

- ✓ There is need to intensify quality control of products

Developing animal feeds :

- ✓ Survey of the available feeds and their quality and promotion of their use.

I. INTRODUCTION

The Government of Rwanda has a national vision of modernizing several development sectors by the year 2020. The national vision known as vision 2020 (GOR 2003) and other policies recently developed such as the poverty reduction strategy are key strategic frameworks that will guide government during this period. One of the key pillars of vision 2020 is the transformation of Agriculture from subsistence to a productive, high value, market-oriented agriculture that has an impact on other economic activities (GOR, 2003).

It is in this context that the Ministry of Agriculture and Animal husbandry has recently proposed a new policy on Agriculture which will evolve around four strategic axes:

- i. The modernization and transformation of Agriculture.
- ii. The development of important commodities (Filières).
- iii. Competitiveness of the products on the market.
- iv. Higher entrepreneurship capacity by the farmers.

According to the national vision, the transformed subsistence farmer is envisaged to be one that:

- Produces and sells more to the market,
- Is food secure all the time
- Is operating in an organized farmer's association in order to be able to access good markets, inputs and information on improved production technologies.
- Practices farming activities in a manner that does not degrade the environment.

The overall goal for the policy of agriculture is to contribute to poverty alleviation by ensuring food security and generation of income for farmers. Increasing food security aims first at satisfying the domestic demand and selling the surplus to generate cash income. This will ultimately result in improved standard of living by the farmers and the increase in production will be achieved without endangering the environment and natural resources.

II. METHODOLOGY

The present document is prepared with the view to analyse the current situation of animal production in Rwanda, assess the constraints and opportunities, propose strategies to develop the sub-sector and define priorities for action in the short, medium and long term.

The work is based essentially on data from the Ministry of Agriculture and Animal husbandry, the Ministry of Finance and Economic Planning, FAO, published literature, discussions with various partners and analysis of the collected data.

Growth trends and scenarios were developed based on past performance, of the sub sector MINAGRI targets and FAO requirements aiming at bringing the animal production sub-sector to contribute to food security and income generation.

III. CURRENT STATUS OF ANIMAL PRODUCTION

In Rwanda, agriculture contributes to 43% of GDP with livestock contributing 8.8%. The current livestock population consists of 991.697 cattle, 371.766 sheep, 1.270.903 goats, 211.918 pigs, 498.401 rabbits and 482.124 chicken (MINAGRI, 2003). The distribution of animals in Rwanda is given in table 1 and the percentage distribution is given in table 2 and figure 1.

Table1. Livestock distribution per province

PROVINCES	Type of Livestock					
	Cattle	Sheep	Goats	Pigs	Rabbits	Poultry
Butare	53 849	10 038	129 886	35 814	57 017	163 323
Byumba	66 642	70 598	181 485	6 993	29 804	359 784
Cyangugu	35 800	16 469	71 806	19 793	11 364	85 385
Gikongoro	63 865	46 619	85 023	43 295	47 747	71 857
Gisenyi	31 635	39 816	40 161	15 046	58 462	228 355
Gitarama	171 564	20 038	144 375	39 141	86 273	290 781
Kibungo	53 056	3 606	164 963	19 327	14 753	480 415
Kibuye	50 874	55 951	84 134	7 671	34 390	64 287
Kigali-Ngali	84 393	30 634	186 314	11 507	41 965	241 759
Kigali City	28 363	2 751	16 522	1 102	5 781	49 642
Ruhengeri	42 246	70 933	80 829	10 045	103 767	266 828
Umutara	309 409	4 312	85 405	2 183	7 077	179 706
TOTAL	991 697	371 766	1 270 903	211 918	498 401	2 482 124

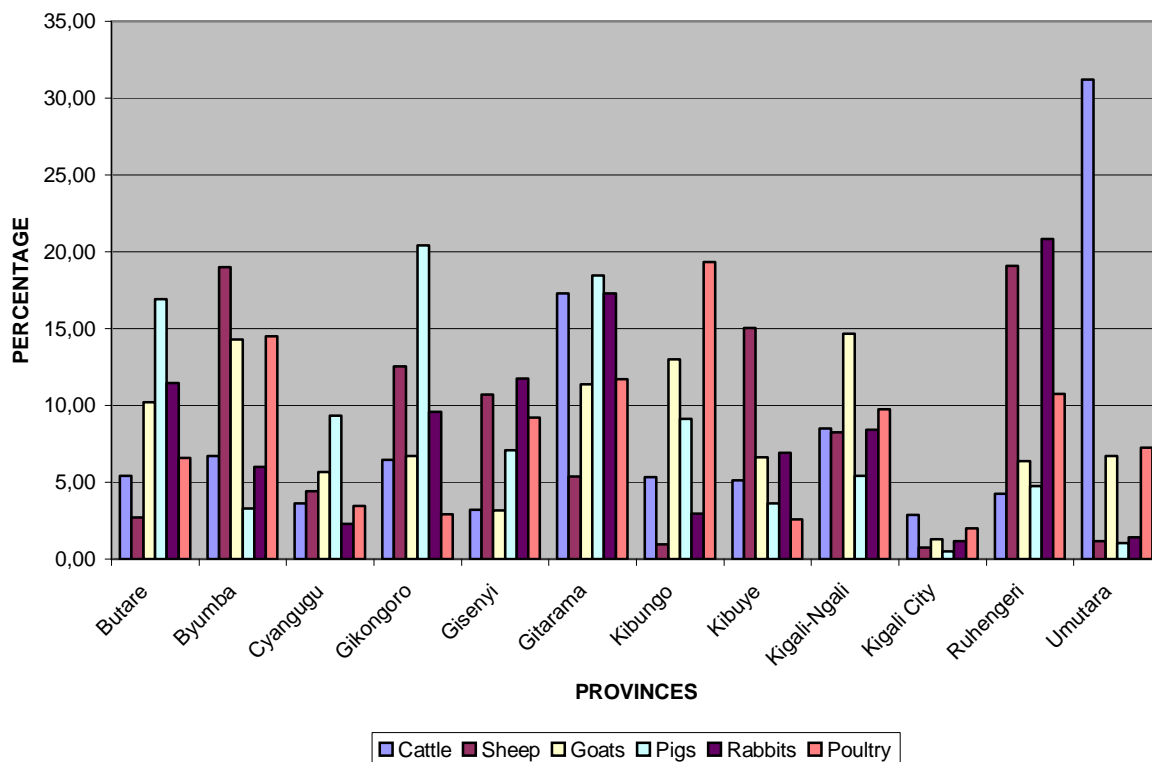
Source: MINAGRI, Directorate of Animal husbandry, 2003

Table 2. Percentage distribution of Livestock population by type of livestock and Province

PROVINCES	Cattle	Sheep	Goats	Pigs	Rabbits	Poultry
Butare	5,43	2,70	10,22	16,90	11,44	6,58
Byumba	6,72	18,99	14,28	3,30	5,98	14,49
Cyangugu	3,61	4,43	5,65	9,34	2,28	3,44
Gikongoro	6,44	12,54	6,69	20,43	9,58	2,90
Gisenyi	3,19	10,71	3,16	7,10	11,73	9,20
Gitarama	17,30	5,39	11,36	18,47	17,31	11,72
Kibungo	5,35	0,97	12,98	9,12	2,96	19,35
Kibuye	5,13	15,05	6,62	3,62	6,90	2,59
Kigali-Ngali	8,51	8,24	14,66	5,43	8,42	9,74
Kigali City	2,86	0,74	1,30	0,52	1,16	2,00
Ruhengeri	4,26	19,08	6,36	4,74	20,82	10,75
Umutara	31,20	1,16	6,72	1,03	1,42	7,24
TOTAL	100,00	100,00	100,00	100,00	100,00	100,00

Source: MINAGRI, Directorate of Animal husbandry, 2003

Figure 1. Percentage distribution of livestock population by type of livestock and province (2003)



The data shows that for cattle the three provinces that have the largest numbers are Umutara, Gitarama and Kigali-Ngali. Sheep are found predominantly in the provinces of Ruhengeri, Byumba, Gikongoro, Gisenyi and Kibuye. Goats are found mostly in Kigali Ngali, Byumba, and Kibungo. For pigs, the three provinces that are dominant are Gikongoro, Gitarama and Butare. Rabbits are mostly found in Ruhengeri, Gitarama and Gisenyi while chicken are found mostly in Kibungo, Byumba, and Gitarama.

The major animal products in Rwanda include milk and milk products, meat and meat products, hides and skins, eggs and manure. They are also a source of cash income to the farmer.

The total levels of animal products (tons) in Rwanda during the last 4 years were as follows:

Year	Milk (Tons)	Meat (Tons)	Fish (Tons)	Eggs (Tons)	Honey (Tons)
1999	56,577	22,807	6,463	1,417	528
2000	57,853	25,608	6,996	920	762
2001	63,484	35,748	7,308	1,015	760
2002	97,981	39,126	7,612	2,432	819
2003	112,463	41,937	8,144	3,402	908

Source: MINAGRI, Directorate of Animal husbandry, 2003

Production systems in Rwanda are essentially traditional with very little improved husbandry techniques and feeding. Intensive production with improved breeds, particularly for milk production is developing around Kigali City. The Gishwati area constitutes another major milk production zone with high production breeds.

According to FAO, the minimum per capita annual requirement for milk consumption is 220 litres, while the requirement for meat is 50 kg per year. (FAO, 1999) However, the current consumption of milk and meat in Rwanda stands at very low levels with that of milk at 12 litres per person per year and about 4.8 kg of meat per capita per year.

This means therefore that there is a big deficit in the production and consumption by the population and the policy must aim at finding means to narrow the gap.

IV. CONSTRAINTS AND OPPORTUNITIES

4.1. Constraints

Poor animal nutrition, both quantity and quality. This is due to a shortage in farming land and insufficient and non-controlled commercial feeds. In addition, the limited use of by-products in animal feeding also lowers the level of animal production. The availability of feed resources, both in quantity and quality in the country varies greatly throughout the year. Although feed availability depends to some extent on climatic conditions, particularly rainfall and the length of growing season, in most cases the feed situation becomes critical during the dry season. During this period, the poor pastures on which many animals depend and the insufficient use of crop residues result in inadequate feeding of stock. This has adverse implications on reproductive efficiency of animals as feed nutrients become inadequate in supporting the potential yield levels.

Pasture is the cheapest form of animal feeds. The expensive concentrates are only required at very high levels of management. For good animal production, pasture species are required which give a high yield of palatable and digestible herbage, containing adequate nutrients for the animal. Grasses and legumes vary considerably in their nutritive value and productivity. It is therefore important to select those species, which have been found suitable for the area in which the pasture is to be sown. As improved breeds of stock become more readily available in the country, provision of better nutrition management becomes even more important.

Feed for non-grazing animals like pigs and poultry, which is maize dependent, is also affected by seasons. When the maize supply is low, the availability of maize bran, which constitutes more than 70% of the ingredients, becomes very low thereby reducing animal production.

Water is important in the life of an animal for production and general physiology. Milk constitutes over 60% water indicating that water must be available at all times. However, the availability of water to the animals in the country is very limited and this greatly affects animal production especially during the dry season.

Minerals are very vital in an animal's diet. Some may be available in soils and feed while others may be given as supplements. Deficiency of minerals in the diets of animals results in disorders, which lower production and slow the growth of animals.

Animal diseases including zoonoses. Rwanda is surrounded by four countries and there is a risk of epidemic diseases coming from neighbouring countries. Moreover, Umutara Province, which has the highest cattle population, is close to a National park with high risks of diseases from wild animals. The presence of diseases among livestock causes economic losses to farmers and the country and reduces the chances of trade in animals and animal by products. The incidence of most diseases including zoonoses not known,

Poor performing local breeds. The local breeds are less productive than their exotic counterparts and yet the principle target for the agriculture policy is to achieve high animal production. In Rwanda, the national cattle herd consists of 86% local Ankole breed and a high proportion of goats, pigs and chicken are local and yet the production potential of the local animals is low. This

indicates that production will be low until there is an effort to improve the local breeds of animals using various technologies.

Limited diversification of animal husbandry. Livestock production has in the past emphasized cattle keeping ahead of other animals. However cattle have a long generation interval. Age at first breeding may be 3 years indicating that a cow may give birth to her first calf after 4 years. This means that farmer may start to use the animal products like milk after 4 years, which is a long time if one is fighting poverty and food insecurity. On the other hand small ruminants and monogastrics have a much quicker reproduction rate and in most cases have multiple offsprings while they are cheaper to keep. They can thus contribute much faster to income generation, particularly for small-scale farmers. Moreover, the use of multiple species offers advantages like complementarity in forage utilization like in the case of sheep and cattle grazing together and the use of cow dung as manure in agriculture production. All these advantages cannot be realised unless farming systems are integrated and multi species dependent. In addition, other small-scale industries like the bee industry are not organized. The bee industry lacks strong promotion and there is no policy on bee keeping in the country. The bees are also threatened by the use of agrochemicals in tea and coffee estates and the general destruction of habitats. There is also poor development of markets for honey in the country.

Weak farmers' organisations. Though one meets a number of farmers associations in the rural areas, these are usually small local associations with low capacity, being in human and financial resources as well as organisational capacity. With strong organisations, farmers can as a group acquire inputs, discuss production problems, negotiate good markets and have direct dialogue with extension agents in order to improve production and alleviate poverty. There is also a weak marketing organisation, especially regarding the marketing of milk in the country as the collection centres are far apart and the price differences between producers and consumers in various locations are high.

Inappropriate veterinary legislation. The laws on animal health are outdated and the penalties for breaking laws are ridiculously low. Hygienic procedures and practice in the processing and handling of animal by products is low especially in the rural areas where animal health workers may not reach. It is known that the susceptibility of Tuberculosis by patients suffering from HIV/AIDS is high (Nyakahuma pers, comm), It is also known that tuberculosis and brucellosis incidence in the country is also high Yet these are diseases which are spread from animals to man especially through the consumption of unboiled milk. The risk therefore of contracting these diseases through the consumption of unboiled milk by vulnerable groups suffering from HIV/AIDS is high because they may lack the information about the risks and also because they may not have the means and the energy to follow health regulations. In addition, there are also unclear rules related to importation, quality assurance and handling of veterinary drugs and other inputs. The ambiguous rules make it easy for them to be broken and this affects animal production. Uncontrolled movement of animals and their by-products spreads diseases from one area to another while the unregulated trade in animal drugs encourages unscrupulous traders to deal in fake or unregistered drugs in the country.

Weak veterinary services delivery. There are few cadres of service providers in the livestock industry in the country. These include Veterinary Doctors, Assistants and Artificial Insemination technicians. The lack of these personnel especially in the remote areas where livestock is kept leads to poor veterinary service delivery.

Poor investment in livestock industry. Livestock farming especially among pastoralists is usually done with minimum inputs. On the other hand, inputs are required to ensure increased productivity. In addition, there are a few organizations investing in livestock because of long periods, which are needed to realise profits. This therefore makes the livestock industry less profitable and many people are not encouraged to try livestock farming a business and yet it can contribute significantly to the economy if more investment is made in the sector.

Inaccessibility of credit to small-scale farmers. There is very limited access to credit in the rural areas where majority of farmers operate. This hinders the adoption of improved farming technologies by the farmers as they have no money to invest in inputs and this results in poor animal production.

Inadequate linkage between research and extension to farmers. Until now, research has been conducted mostly in research stations without much impact on farming communities. The farmer continues to use unimproved methods of animal production and this does not result in the transfer of improved technologies from research stations to the farmer in order to boost production.

4.2. Opportunities

Decentralisation policy. The government of Rwanda has adopted a decentralization policy aiming at bringing services close to the population. According to this policy, the Umurenge is going to be the focal unit for development. The veterinary services should target an improved delivery at umurenge level in district whose main economic activity is livestock. With the presence of veterinary staff at umurenge level, the delivery of veterinary services will improve as the staff will be able to offer extension services to the population more effectively in addition to curative and prophylactic measures to the animals and animal health and production will greatly improve.

Land policy that will encourage investment in farming. More than 50% of livestock husbandry in the country is done on state and leased land. However a new land policy is being drafted which will encourage investment in farming once the land tenure is secure. With the enactment of the land bill, farmers will be able to invest more in animal husbandry in terms of inputs, better performing breeds and a good nutritional base and animal production will improve.

Review of laws related to Animal health. The Government is currently reviewing laws related to animal husbandry to make them rhyme with the present times. Once this is done, health will improve thereby making it safe to consume more animal products and this will encourage farmers to produce more and sales will increase and generate more income to the farmers.

Strengthening of the veterinary profession. The veterinary profession in Rwanda through the Veterinary Association (ARMV) is being streamlined so that it plays a role in veterinary service delivery and other aspects of animal husbandry. With an improved veterinary service delivery, animal health, production and marketing will improve and this will bring more income to the population.

Availability of credit facility to farmers. The Development Bank of Rwanda (BRD) has been giving loan facilities to farmers wishing to import exotic animals from outside the country. This importation will improve the genetic germ plasm and animal productivity in the country. There are also funding opportunities through projects like RSSP and PADEBEL. However, there is need to extend the microfinance facilities to small-scale farmers who constitute the majority of livestock operators. With more and favourable loan facilities to farmers, there will be more investment in animal production and consequently productivity and processing of animal products will increase and farmers will be able to obtain more income from their animals. Organisations like Heifer Project International have been giving heifers to families to start them off. The beneficiaries give out the first female offspring to the next recipient and this has helped families access milk and manure for their gardens. There is a potential for development of the bee industry in Rwanda. Bee keeping can be done in remote areas of the country and can alleviate poverty to small-scale farmers. There is also another advantage that favours apiculture in that many communities in the country are traditional beekeepers.

V. TARGETS FOR DEVELOPMENT

The development of the Animal production sub-sector must identify targets that will be the subjects of strategies to overcome the constraints and develop different action programmes that will increase the contribution of livestock to the national economy.

This will be done essentially through three main orientations, the modernization and intensification of animal production, the diversification of production and the transformation and conservation of animal products.

The approach will target the development of crucial commodities (filières), mostly milk, meat, fish, eggs, honey and hides and skins.

Milk production will be based on cattle. The modernization and intensification will be done through the following means:

- ✓ Introduction of better performing breeds through artificial insemination, embryo transfer, use of pure breed bulls to reduce the proportion of local breeds, which produce very little milk.
- ✓ Importation of pure breed cows that have better yields.

The overall target will be to achieve by the year 2020 a reduction in the number of cattle while increasing the production of milk to cover the needs of the population.

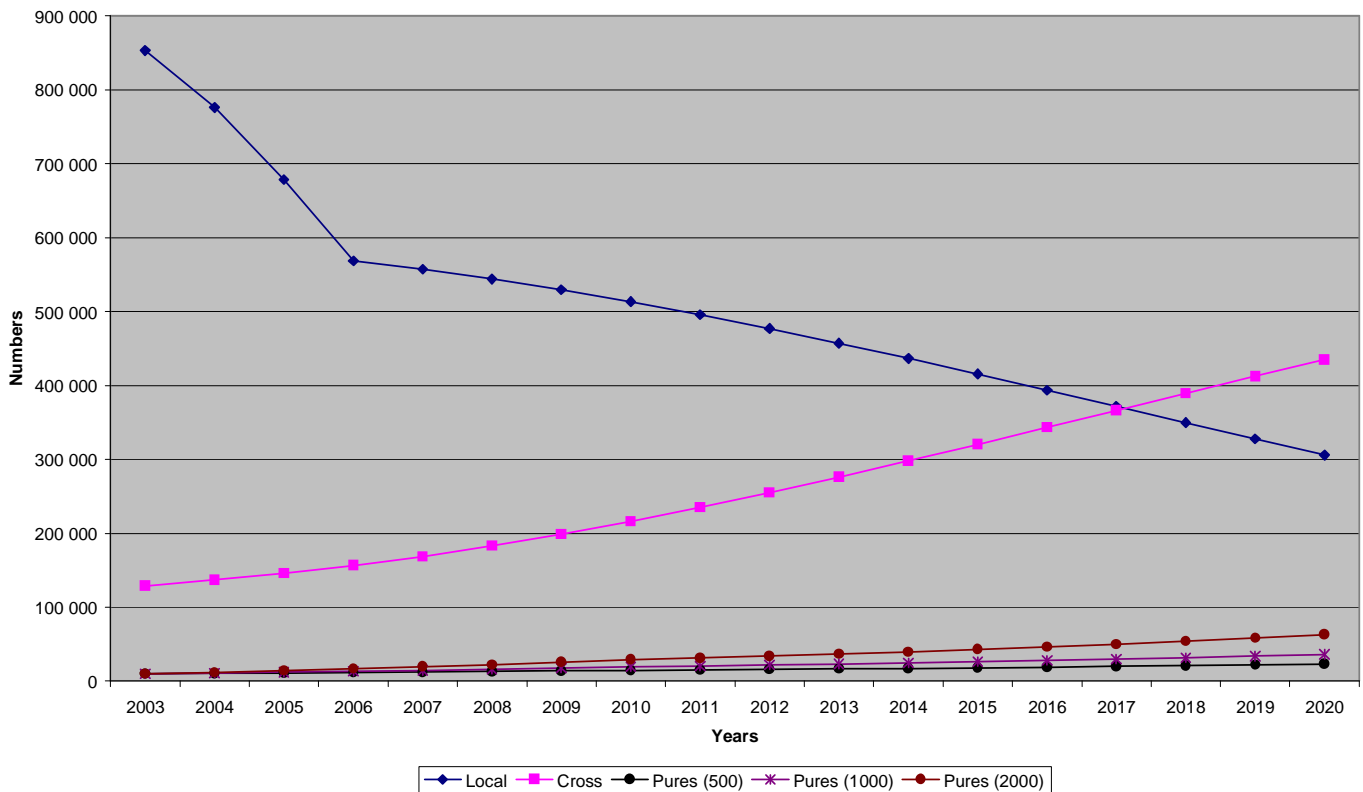
Table 3 and Figure 2 show the projections of cattle population evolution until 2020.

Table 3. Projection of the cattle population in the country

SPECIES	2003	2004	2005	2006	2007	2008	2009	2010
Local	852 859	776 102	678 313	568 426	557 171	544 134	529 442	513 241
Cross	128 921	136 682	146 178	156 410	168 668	182 815	198 699	216 149
Pures (500)	9 917	10 417	10 999	11 628	12 307	13 041	13 833	14 689
Pures (1000)	9 917	10 917	12 082	13 341	14 701	16 169	17 755	19 468
Pures (2000)	9 917	11 917	14 249	16 767	19 487	22 425	25 598	29 024

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
495 688	476 951	457 205	436 631	415 411	393 726	371 756	349 674	327 645	305 824
234 985	255 017	276 048	297 880	320 312	343 148	366 197	389 276	412 211	434 842
15 272	15 900	16 580	17 313	18 106	18 962	19 886	20 885	21 963	23 128
20 633	21 892	23 251	24 720	26 305	28 018	29 868	31 866	34 024	36 355
31 356	33 874	36 594	39 532	42 705	46 132	49 832	53 829	58 146	63 182

Figure 2. Projection of cattle population



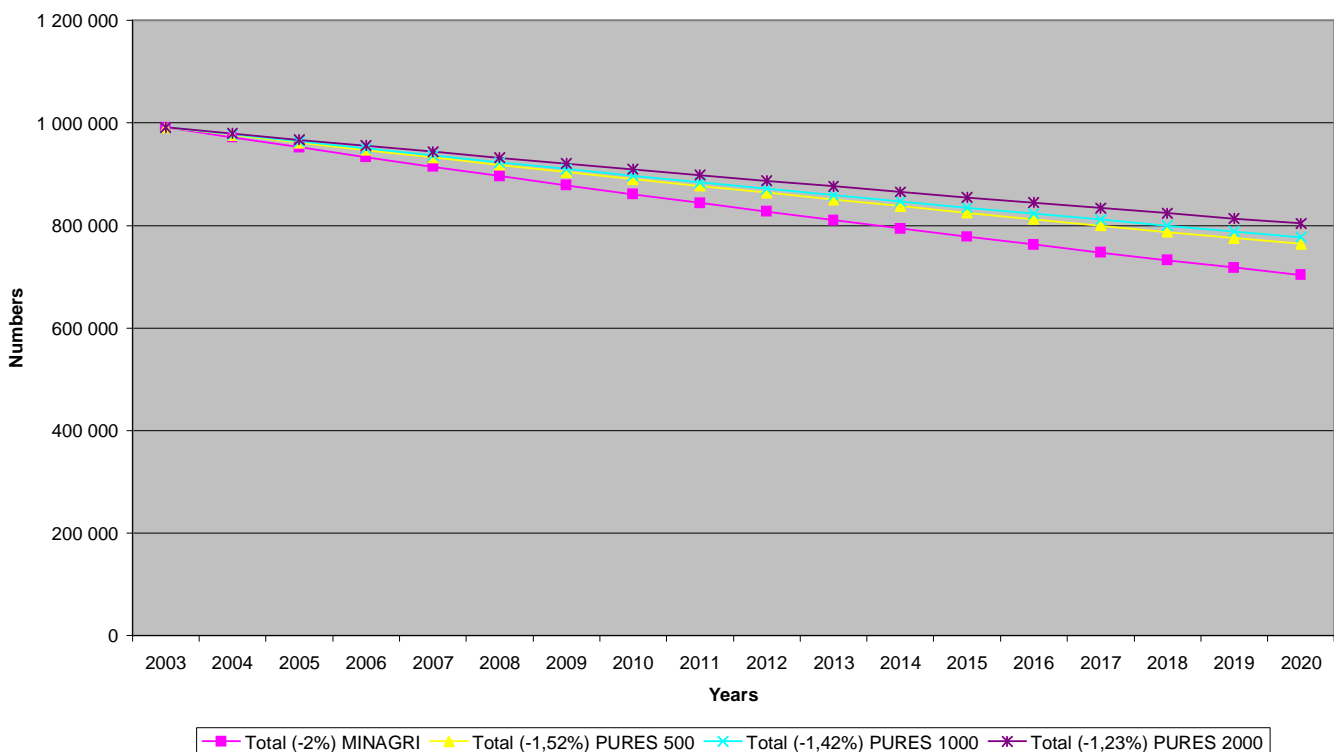
The projections are based on the following assumptions:

- i. The total cattle population in 2003 is 991, 697. There is a 2% reduction every year in the total cattle population to ensure that there is no environmental degradation. By the year 2020, the total cattle population will be 703.432.
- ii. The cattle population in 2003 consists of 86% local breeds, 13% cross-breeds and 1% exotic breeds. Local breeds will be crossed to transform the national herd. In year one, 5% will be crossed and thereafter 2% every year. At the same time, 18% of the local breeds will be culled every year and taken to slaughter house. This transformation will change the number of local cattle from 852859 in 2003 to 305824 by the year 2020.
- iii. The crosses make 13% of the cattle population. It is assumed that on average 40% of the herd is in the reproductive phase. Through the proposed transformation scheme, by the year 2020, the crosses would have moved from 128,291 to 434,842 constituting the largest portion of the cattle population.
- iv. The population of exotic breeds stands at 9,917. Currently there is a program to import 500 pure breed cows every year. This programme is supposed to continue until 2010. They produce a calf during the first year of arrival and every year thereafter. The fertility rate is around 80%. The newly born calves start producing a calf in their third year of life. This will increase the number of exotic cows to 23, 138 by the year 2010.
- v. The introduction of 500 pure breeds cows every year until 2010 would bring the reduction of the total cattle population at 1.52% every year instead of 2%. The total cattle population would in that case reduce from 991,697 to 763,793 in 2020 consisting 305,824 locals, 434,842 crosses and 23,128 pure breeds. If the number was increased to 1000 cows per year, the annual reduction of cattle population will be 1.42% while the reduction will be 1.23% if the imported cows were brought to 2000 per year.

- vi. Importing an exotic cow into the country requires 2,000 US \$. Therefore, importing 500 animals per year would require 1,000,000 \$ per year up to 2010. This figure will be doubled if 1,000 animals are imported and will be four (4) times if 2,000 animals are imported every year up to 2010. A bigger number of animals would increase production but would also have other implications in that imported animals need extra preparations like shelter, water and pasture development, health facilities, and general management practices. All these would be in place before animals are brought into the country. Once animals are already in the country, not only those facilities mentioned above will be necessary, but also a follow up of their performance will be required.

Figure 3 shows the three scenarios of importation

Figure 3. Percentage reduction of the cattle population



Meat production will be pursued through the diversification of animal production. Currently, the livestock domain is dominated by cattle rearing. The policy should promote the rearing and development of other species, mostly goats, sheep, pigs, poultry, rabbits and fisheries.

It is proposed that three growth trends be used for the intensification of the animal products:

- ✓ The first trend is based on the growth rate target for the sub-sector as envisaged by MINAGRI in 2003.
- ✓ The second trend is calculated on the average of the animal production in the last four years.
- ✓ The third trend is based on consumption requirements as defined by FAO.

The growth rates proposed by the different trends for the major animal production are as follows:

Table 4. Growth trends for Animal production

PRODUCT	FIRST TREND	SECOND TREND	THIRD TREND
MILK	10.35%	20,74%	21,91%
MEAT	14.85%	17,13%	17,93%
EGGS	34.66%	38,09%	-
FISH	12,5%	6,09%	-
HONEY	38,96%	15,67%	-

Table 5 shows the targeted projections for animal production according to 3 scenarios.

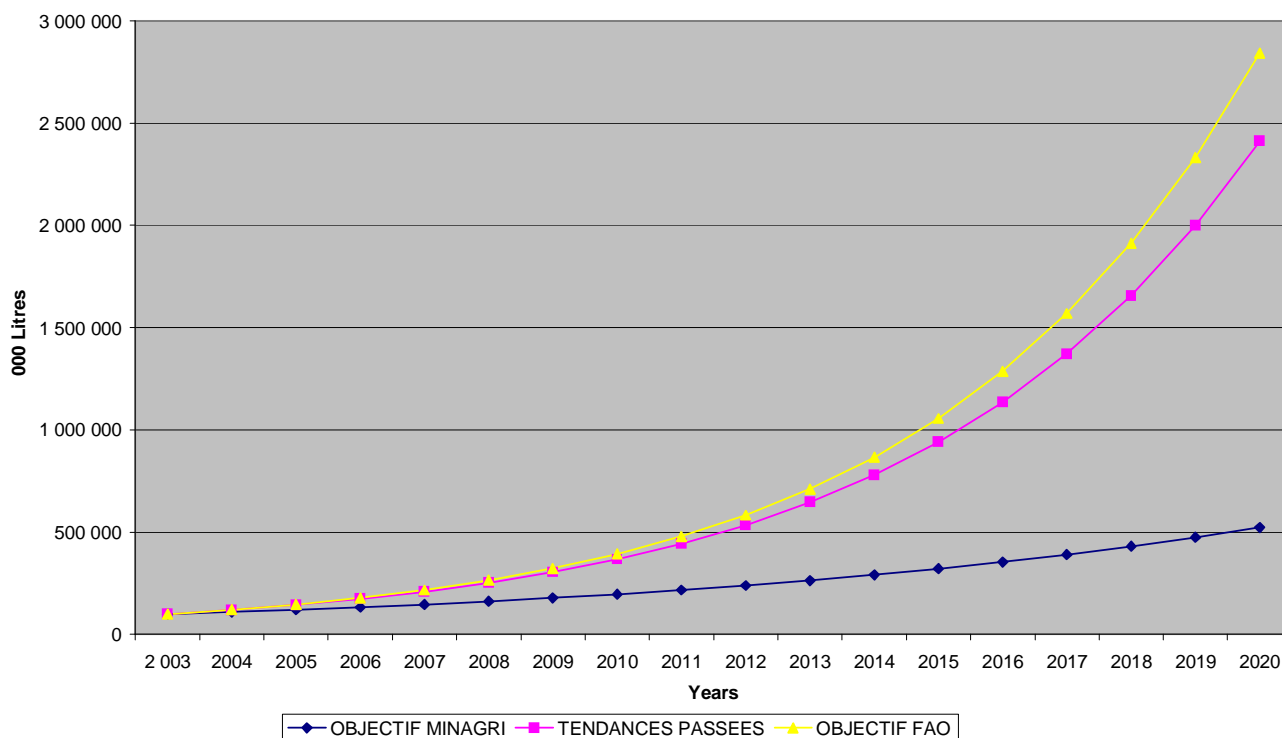
Table 5. Targeted projections of Animal production (Tons)

		Growth Rate	2 003	2004	2005	2006	2007	2008	2009	2010
Milk	MINAGRI OBJECTIVES	10,35%	97 981	108 127	119 323	131 679	145 315	160 362	176 968	195 293
	RECENT GROWTH TRENDS	20,74%	97 981	118 302	142 838	172 463	208 232	251 419	303 563	366 522
	FAO OBJECTIVES	21,91%	97 981	119 447	145 615	177 517	216 407	263 818	321 616	392 075
Meat	MINAGRI OBJECTIVES	14,85%	28 540	32 777	37 644	43 232	49 651	57 023	65 489	75 212
	RECENT GROWTH TRENDS	17,13%	28 540	33 429	39 155	45 863	53 719	62 921	73 699	86 324
	FAO OBJECTIVES	17,93%	28 540	33 658	39 694	46 812	55 206	65 106	76 782	90 551
Eggs	MINAGRI OBJECTIVES	34,66%	2 432	3 275	4 410	5 939	7 998	10 770	14 504	19 531
	RECENT GROWTH TRENDS	38,09%	2 432	3 358	4 638	6 404	8 843	12 212	16 863	23 286
Fish	MINAGRI OBJECTIVES	12,50%	7 612	8 564	9 634	10 838	12 193	13 717	15 432	17 361
	RECENT GROWTH TRENDS	6,09%	7 612	8 076	8 567	9 089	9 643	10 230	10 853	11 514
Honey	MINAGRI OBJECTIVES	38,96%	819	1 138	1 581	2 198	3 054	4 244	5 897	8 194
	RECENT GROWTH TRENDS	15,67%	819	947	1 096	1 267	1 466	1 696	1 962	2 269

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
215 515	237 832	262 459	289 637	319 629	352 726	389 251	429 558	474 039	523 126
442 539	534 321	645 139	778 941	940 494	1 135 552	1 371 066	1 655 425	1 998 760	2 413 303
477 972	582 686	710 341	865 964	1 055 680	1 286 959	1 568 907	1 912 625	2 331 644	2 842 463
86 378	99 202	113 931	130 846	150 272	172 583	198 206	227 633	261 429	300 243
101 111	118 432	138 719	162 481	190 314	222 915	261 101	305 827	358 215	419 578
106 789	125 939	148 523	175 157	206 567	243 610	287 296	338 815	399 574	471 228
26 301	35 418	47 696	64 229	86 493	116 475	156 850	211 221	284 439	383 036
32 156	44 404	61 318	84 674	116 926	161 463	222 964	307 891	425 167	587 113
19 531	21 972	24 719	27 808	31 284	35 195	39 594	44 544	50 112	56 376
12 215	12 959	13 748	14 585	15 474	16 416	17 416	18 476	19 602	20 795
11 387	15 823	21 988	30 554	42 458	59 000	81 986	113 928	158 315	219 994
2 625	3 036	3 511	4 062	4 698	5 434	6 286	7 271	8 410	9 728

Figure 4 and table 5 show the projection for milk, meat, fish and eggs production. It indicates that if maintained, the average growth realised in the last four years will bring the milk production at a level that is not far from the FAO requirements. Table 5 in addition shows projected production of eggs, fish and honey according to the projections made by MINAGRI. The analysis shows that meat and milk production will be close to the value recommended by FAO.

Figure 4. Milk projection



With reference to the current policy of importing 500 pure breed cows per year, a different scenario of importing 1000 and 2000 cows was considered and the projected impact of milk production, taking into account the transformation of the cattle population by the year 2020, analyzed. The projections are based on the assumption that 40% of the cattle population will be dedicated to milk production.

The importation of 500, 1000 and 2000 pure breed cows each year between now and 2010 will lead to the production of respectively 2,000,463,000 litres, 2,079,825,000 litres and 2,240,785,000 litres by the year 2020. At a level of 2000 cows imported per year for the next six years, milk production would be very high and the country could envisage to cover the needs as per FAO requirements by the year 2020. However, the implications of this importation must be looked at against the background of the human and infrastructural capacity to handle the numbers in the country. The numbers of the veterinary staff in the country is low. This would therefore have an impact on the health of the animals. The cash flow to import the cows would be high during the first six year indicating that government would make it a priority to ensure that the money is always available; In addition adequate investment in water, pasture and handling infrastructure would be put in place before such big numbers are imported.

Figures 5a and 5b show the meat projection. Again, the average growth rate observed in the last four years would allow to cover the needs of the population at a level that is close to FAO requirements. While figure 5a shows the trend for the total meat projection, figure 5b breaks down the production according to the different species, namely cattle, small ruminants, pigs and rabbits.

Figure 5a. Meat projection

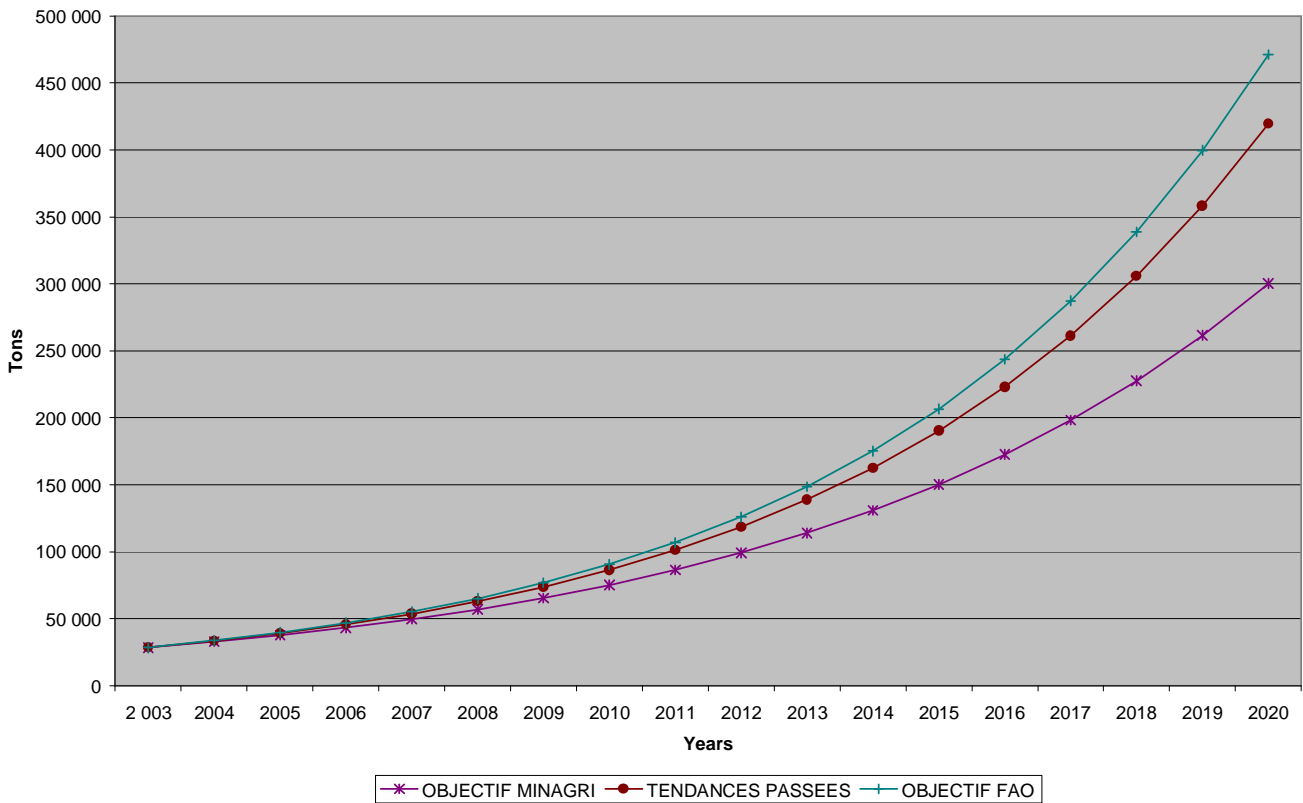


Figure 5b. Breakdown of meat production as per MINAGRI trend

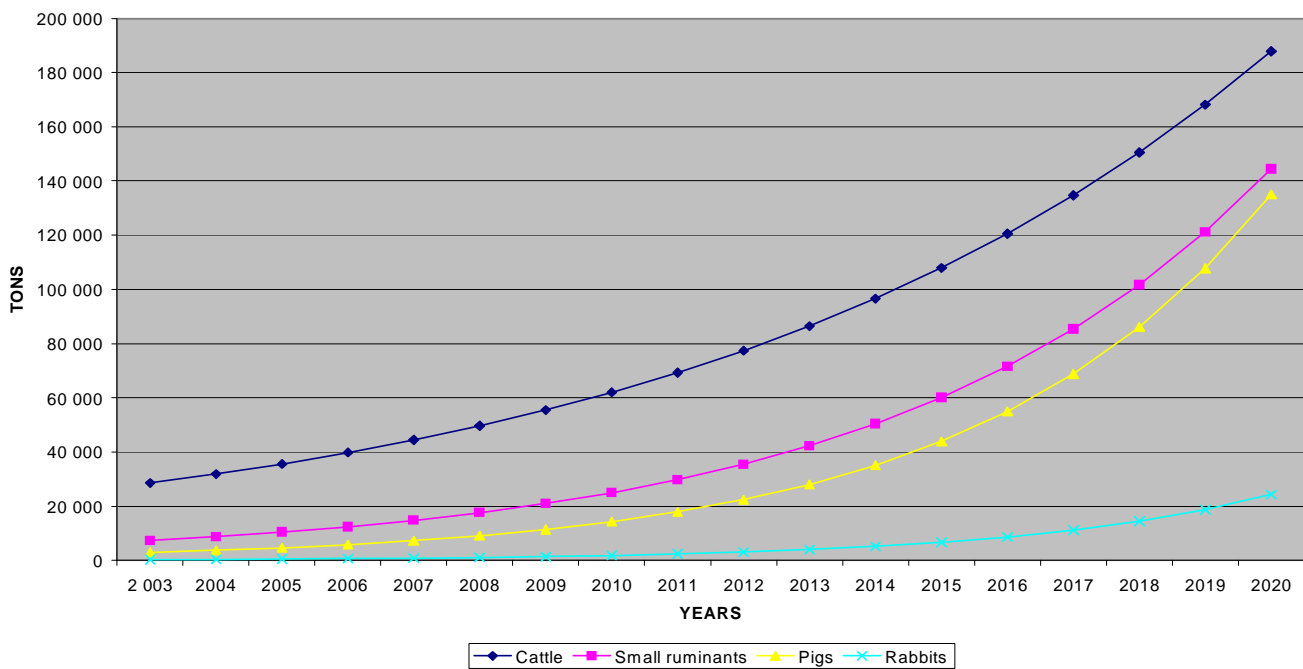


Figure 6 shows the projection for the production of eggs. Eggs production will be the major target for chicken.

Figure 6. Eggs projection.

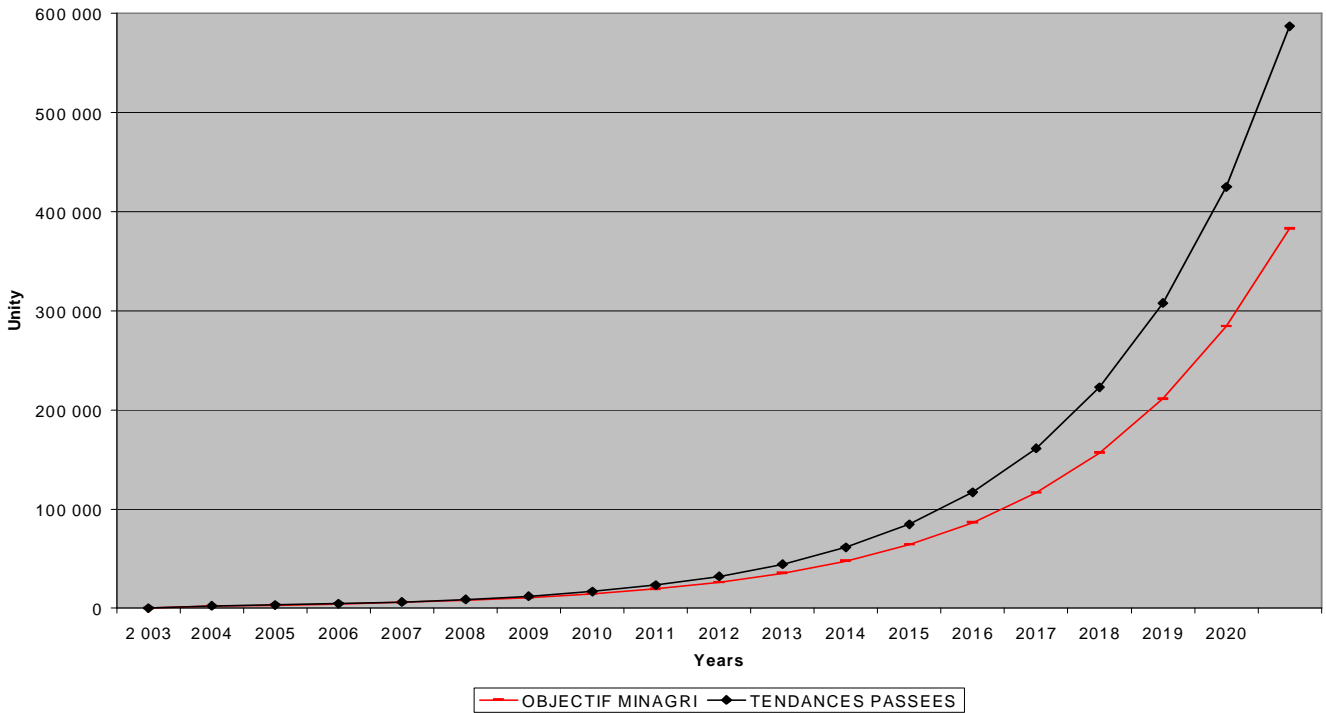


Figure 7 shows the projection for Fish production. While for the previous products, the MINAGRI trends was lower that the growth average achieved in the last four years, for Fish, the MINAGRI target is higher that the past average growth.

Figure 7. Fish Projection

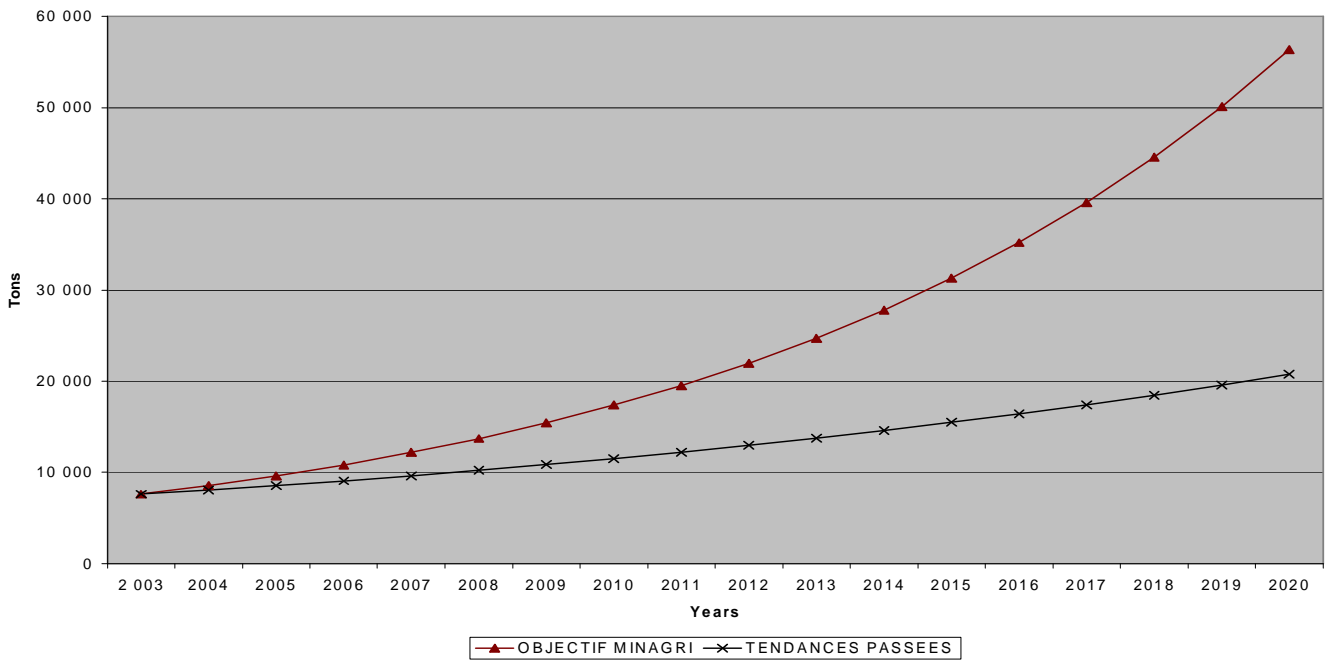
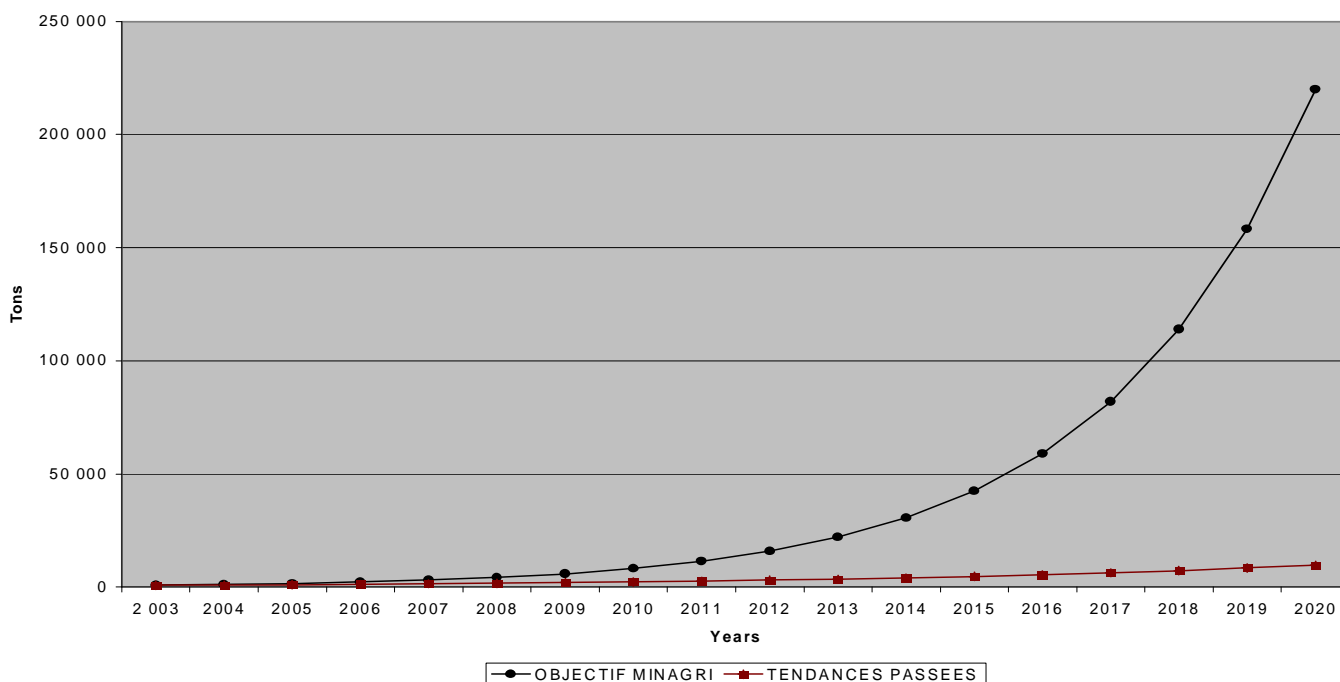


Figure 8 shows the projection for honey production. Here again, the growth rate targeted by MINAGRI is higher than the past average.

Figure 8. Honey Projection



The transformation and conservation of the animal products will be a key component of the development of the animal production sub-sector. The major benefits of this process will be essentially three fold:

- a. Reduce the loss of animal products.
- b. Additional value by the development and use of meat and milk by-products.
- c. Improved quality and competitiveness of the products.

VI. STRATEGIES

The strategies will be guided by three major principles:

- They should be sensitive to the development of the grass roots
- producers who constitute the bulk of the production force.
- They have to be progressive, flexible and dynamic.
- They have to be demand-driven and offer incentives to the producers.

The principles objectives of the strategies are also three fold:

- i. Organise and strengthen the capacity of producers to allow them to play a decisive role in the development of animal production in Rwanda.
- ii. Strengthen the capacity of service providers to enable them to respond effectively to producers demands.
- iii. Establish a favourable environment and legal framework for investment in the animal production sub sector and thus promote its development.

Seven (7) strategies are proposed:

- i. First strategy: Encourage the formation of farmers associations at all levels (sector, district, national). One of the strategies of carrying out extension to farmers is to have them

organized in groups; The associations will also allow the farmers to have the following benefits among others:

- Acquisition of managerial and entrepreneurial skills.
 - Better access to inputs.
 - Access to extension information as a group.
 - Better way of effecting change as a group.
- ii. Second strategy: Integrate Agriculture and Animal production activities so as to improve the feeding base of the national herd. The principal benefits of this integration are the following:
- Use of agricultural bi-products in animal feeding resulting in better production.
 - Use of manure for soil protection and hence better pastures for animals.
- iii. Third strategy: Improve performance of local breeds and diversify animal production by promoting a multispecies system.
- Strengthen the CNIA and the National Hatchery to enable them to deliver.
 - Increase the capacity of the technical staff.
 - Sensitize the population to the use of improved techniques in animal breeding.
 - Sensitize the population to the advantages of the diversification.
- iv. Fourth strategy: Improve Animal health.
- Build capacity for veterinary service delivery by training staff
 - Strengthen the National veterinary laboratory.
 - Expedite the process of veterinary legislation.
 - Encourage the participation of private practitioners in the delivery of services.
- v. Fifth strategy: Decentralisation of service delivery.
- Deploy trained veterinary staff in imirenge, which have intense animal production activities.
 - Ensure continuous training of this staff to have maximum efficiency.
 - Provide adequate means to respond to producers' demands.
- vi. Sixth strategy: Create an enabling environment for private investment in livestock industry, including micro finance: Livestock farming must be looked at as a business; this requires inputs in order to get good products. These inputs, which may be drugs, and feeds all require to be bought and the farmers may not always have the money. The strategy should be to create an environment for investment through
- Review the interest rate and refund periods for livestock loans.
 - Ease the issue of collateral for small-scale farmers.
 - Facilitate loans access to farmers associations.
 - Activate the agricultural security fund.
- vii. Seventh strategy: Increase linkage between training, research and extension to farmers.
- Conduct research under farming conditions.
 - Encourage training institutions to develop extension programmes with farmers.
 - Enable training and research institutions to develop and transfer technologies so as to have an impact in their immediate environment.

VII. ACTION PLAN

7.1. Logical framework for operationalisation of the strategy

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>N.1. Overall Goal</p> <p>N.1.1. Poverty reduction by ensuring Food security and Income generation</p>	<p>V1.1. More families who keep livestock move above the poverty line</p>	<p>M.1.1. Ministry of Finance and Economic Planning records; Rwanda Development Indicators</p>	<p>A 1.1. There is continuous political stability</p> <p>A 1.2. There are no major changes in National Agricultural Policy</p>
<p>N.2. Specific goals</p> <p>N.2.1. Modernization and intensification of Animal Production</p> <p>N.2.2. Diversification of Animal Production</p> <p>N.2.3. Transformation and conservation of Animal products</p>	<p>V 2.1. The total cattle population is reduced.</p> <p>V 2.2. The local cattle population is reduced.</p> <p>V 2.3. The crossed animals are increased.</p> <p>V 2.4. Pure breeds are increased.</p> <p>V 2.2.1. There is an average of 5 goats and a pig by household.</p> <p>V 2.2.2. There is an average of 5 chickens per household.</p> <p>V 2.3. Semi-processed and/or processed animal products are increased.</p>	<p>M.2.1. MINAGRI Reports</p>	<p>A 2.1. Funds are available for the transformation of the agriculture sector.</p>
<p>N.3. PURPOSE</p> <p>N.3.1. Increase animal production.</p>	<p>V.3.1.1. Milk collection network is improved with better involvement of dairies.</p> <p>V.3.1.2. Milk reaches 251,419tons by year 2008 and 2,413,303 tons by year 2020.</p> <p>V.3.1.3. Meat production reaches 62,921 tons by the year 2008 and 419,578 tons by the year 2020.</p> <p>V.3.1.3. Eggs production reaches 12,212 tons by the year 2008 and 587,113 tons by the year 2020.</p>	<p>M.3.1. Records from MINAGRI, MINICOM, MINECOFIN, BNR</p>	<p>A.3.1. The population adopts modern farming techniques</p>

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>N.3.2. Increase Farmers income.</p> <p>N.3.3. Food security improved</p>	<p>V.3.1.4. Fish production reaches 13,717 tons by the year 2008 and 56,376 tons by the year 2020.</p> <p>V.3.1.5. Honey production reaches 4,244 tons by the year 2008 and 219,994 tons by the year 2020.</p> <p>V.3.2.1. More products are sold on the market.</p> <p>V.3.2.2. The country imports less animal products.</p> <p>V.3.2.3. Farmers save more and benefit from more microfinance institutions.</p> <p>V.3.3. Animal products contribution to lipid contents of diet increases.</p>	<p>M.3.3. Records of MINISANTE and MINAGRI</p>	<p>A.3.2.1. COMESA and East African community offer wider opportunities for trade.</p> <p>A.3.2.2. Financial institutions agree to set up conditions that are favourable to small-scale farmers in particular and investment in livestock industry in general.</p>
<p>N.4. OUTPUTS</p> <p>N.4.1. Organize farmers.</p> <p>N.4.2. Improve the animal feeding base.</p> <p>N.4.3. Improve the performance of local breeds.</p> <p>N.4.4. Identify Diseases, which constitute major constraints to animal production.</p> <p>N.4.5. Improve veterinary service delivery.</p>			

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
N.4.6. Speed up the legislation process.			
N.5. ACTIVITIES			
N.5.1. Encourage the formation of farmers association.	V.5.1. There is at least a farmer's association at each umurenge having livestock as the major economic activity.	M.5.1. Records of registered organisations at district, provincial and national levels.	A.5.1. The population is convinced of the necessity and benefits to organize themselves into associations.
N.5.2.1. Sensitize farmers to the use of agriculture by-products for animal feeding.	V.5.2.1.1. Workshops are organized for farmers on the use of agriculture by-products. M.5.2.1.2. Presence of model farmers who can be used to convince other farmers.	M.5.2.1. Number of farmers who attend the workshops. M.5.2.2. Number of farmers who adopt the use of animal by products for animal feeding.	A.5.2. Extension services are strengthened and driven by the producer's demand.
N.5.2.2. Control the quality of commercial feeds.	V.5.2.2. Commercial feeds are prepared according to required standards.	M.5.2.2. All the feeds are certified by the Rwanda Bureau of Standards.	
N.5.2.3. Improve the quality of pastures.	V.5.2.3. Number of farmers with improved pastures are increased.	M.5.2.3. Reports by the decentralized structures.	
N.5.2.4. Improve the supply of water in livestock areas.	V.5.2.4.1. Increase the number of water facilities in areas where livestock is a major economic activity. V.5.2.4.2. Rain water is harvested and conserved.	M.5.2.4. Reports from decentralized structures. M.5.2.4.2. Reports from decentralized structures.	
N.5.3.1. Transform the local cattle population by artificial insemination, embryo transfer and importation of pure breeds bulls.	V.5.3. Number of crossed breeds are increased and constitute the major portion of cattle population by the year 2020.	M.5.3. Reports by farmers associations, MINAGRI.	A.5.3.1. CNIA performance is increased.
N.5.3.2. Strengthen the national hatchery.	V.5.3.2.1. Improved breeds are disseminated throughout the country. V.5.3.2.2. Increase in	M.5.3.2.1. Number of farmers taking up poultry.	A.5.3.2. High quality commercial feeds are available.

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>N.5.3.3. Disseminate improved goat rams.</p> <p>N.5.3.4. Sensitize communities on pig farming.</p> <p>N.5.3.5. Identify areas with high potential for fish farming and encourage them to increase their production.</p> <p>N.5.4.1. Strengthen baseline data on Animal health.</p> <p>N.5.4.2. Create public awareness on Animal health.</p> <p>N.5.4.3. Control Major animal diseases.</p>	<p>the production of eggs.</p> <p>V.5.3.3. Goat population increases to reach an average of 5 goats per household by the year 2020.</p> <p>V.5.3.4.1. Workshops organized for farmers.</p> <p>V.5.3.4.2. Private investors establish model farms.</p> <p>V.5.3.5. There is at least one fish farming area in each province.</p> <p>V.5.4.1. Surveys are conducted on major animal diseases (Brucellosis, Tuberculosis, Cysticercosis,).</p> <p>V.5.4.2. Extension materials are produced and disseminated.</p> <p>V.5.4.3.1. Diseases control mechanisms are fully established.</p> <p>V.5.4.3.2. Farmers are sensitized to reporting diseases.</p>	<p>M.5.3.2.2. MINAGRI reports</p> <p>M.5.3.3. MINAGRI reports.</p> <p>M.5.3.4.1. Number of farmers adopting pig-farming increase.</p> <p>M.5.3.4.2. Reports by MINAGRI.</p> <p>M.5.3.5.1. Number of farmers taking up fish farming.</p> <p>M.5.3.5.2. MINAGRI reports.</p> <p>M.5.4.1. Reports by the National Veterinary laboratory (LVNR).</p> <p>M.5.4.2. Radio programmes, brochures and other communication available at the producer level.</p>	<p>A.5.3.4. The population understands the needs to diversify livestock.</p> <p>A.5.4. Veterinary laboratory is strengthened (Human, material and financial resources are increased).</p> <p>A.5.4.2. Veterinary extension staff are available, well trained, equipped and deployed.</p>
<p>N. 5.5.1. Train veterinary doctors and assistants.</p>	<p>V.5.5.1.1. Number of veterinary doctors is increased.</p> <p>V.5.5.1.2. Number of veterinary assistants is increased.</p>	<p>M.5.5.1. MINAGRI and MINEDUC reports.</p>	

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
N.5.5.2. Deploy service providers in areas having livestock as a major economic activity.	V.5.5.2.1. There is a veterinary assistant in imirenge with important livestock activities. V.5.5.2.2. There is an A.I. technician at the district level.	M.5.5.2.1. Reports from the decentralized structures.	A.5.5.2.1. Decentralization policy is well established.
N.5.6.1. Draft the policy on Animal health. N.5.6.2. Draft the Veterinary profession act. N.5.6.3. Draft the veterinary drugs act.	V.5.6.1.1. Animal health policy is submitted to cabinet by March 2005. V.5.6.2.1. Veterinary profession act is submitted to cabinet by March 2005. V.5.6.3.1. Policy on veterinary drugs is submitted to cabinet by March 2005.	M.5.6.1. Cabinet reports.	A.5.6.1.1. MINAGRI is active in pushing the process through the administrative channels. A.5.6.1.2. Cabinet agenda permits the analysis of the drafts.

7.2. Priority actions

The actions will be designed on a commodity (Filière) basis approach.

The commodities that are going to focus the attention are the following:

1. Milk
2. Meat
3. Eggs
4. Fish
5. Honey
6. Hides and skins

Actions will be done in phases with the 2005 serving as a transition year. During this year efforts will be concentrated on Milk production. For the other commodities, actions will be planned in a period of three years, 2006-2008 and thereafter 2010, 2015, 2020.

For Milk production, the following actions are proposed in 2005:

- i. Identify sectors (imirenge) throughout the country, which have milk production as a major economic activity.
- ii. Organize farmers.
- iii. Deploy veterinary staff to the areas.
- iv. Sensitize farmers to the use of agriculture by-products in feeding the animals.
- v. Strengthen the departments of Bacteriology and Serology at the National veterinary laboratory to tackle diseases like Brucellosis and Tuberculosis.
- vi. Reinforce CNIA to enable it to serve better the farmers.
- vii. Sensitize private sector to invest in the milk industry, particularly the establishment of collection centres, the cold chain and the transformation of milk products.
- viii. Pursue with financial institutions the need to create favourable conditions for small-scale farmers to adopt modern technology of farming.

VIII. CONCLUSION

Currently, the contribution of animal production to food security, farmers' income generation and the macroeconomic equilibrium in Rwanda is low.

The present study indicates that animal production can be increased to reach levels that ensure that the needs in animal products can be satisfied and income generated for the producers and other investors in this sub-sector. For this, investment in the sub sector should be increased so that 2000 pure breed animals are imported and adequate infrastructure are built and other preparations are made.

The identified constraints to the development of the sub-sector can all be addressed by the proposed strategies, thus creating the necessary conditions for the development of the animal production industry in Rwanda.

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