



WEST AFRICA LIVESTOCK INNOVATION CENTRE

WALIC ANNUAL REPORT 2019



Photo: WALIC Council members plus 3 WALIC staff on 29th October 201

January 2020

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Executive Summary

This report highlights the Research and Development projects and the ITC transformation process to WALIC implemented in 2019 and the outlook for 2020. The limited core and research funds received in 2019 was used mainly to conduct few research and development projects such as Genetic Improvement supported by Nema project, screening of community cattle herds, and validation of the draft National Strategy and Action Plan funded by AU-IBAR's Genetics project. It also further documented initiatives undertaken on the transformation process of ITC to WALIC.

The Centre has contributed immensely towards food security and increased productivity of indigenous ruminant livestock breeds in The Gambia. Total milk made available to milk consumers coming to WALIC headquarters and Keneba station equalled to **6.202 metric tons** of fresh wholesome milk. This is a good contribution towards improved nutrition for the wellbeing of the population. In addition, the already disseminated 8 elite breeding bucks and 19 elite breeding bulls would contribute immensely to improved productivity of community multiplier herds and flocks. The resulting spill-over of the selection process in the form of **23 bulls and 5 goats** were culled out for slaughter to provide animal protein to the population.

Genetic Improvement Program

The routine breeding and selection process for elite breeding bulls, bucks, and rams were implemented throughout the year. Data gathered on control mating of breeding females, calving, weights, milk off-takes, weaning, treatments, livestock movements between stations, and mortality counts were recorded on the central database. By end of the year, besides the large amount of manure collected and used by community gardeners, **1.741 metric ton** of fresh milk was supplied to the community for a four-month period: August to November. Eight elite/improved breeding bucks were disseminated to multiplier goat producers throughout the country. Nineteen elite/improved breeding bulls are also selected and set for dissemination to multiplier community cattle herds in the Gambia and beyond.

Implementation of an open nucleus breeding scheme for cattle needs some periodic introduction of outstanding young breeding bulls, selected from community cattle herds, into the nucleus breeding herd at Keneba. This warranted for the initiation of screening selected community cattle herds with the objective of selecting potentially good weaned bull calves to be subjected to routine performance test at Niamina up to the age of 36 months. During the first phase of the screening program (August 2019 - March 2020), 150 birth records and more than 1000 milking records have been collected from 30 selected community herds across the country.

Projects Support to the ONBS

Nema project of The Gambia has been supporting the open nucleus breeding scheme (ONBS) through provision of feed supplements, veterinary drugs, top-up allowances for herdsman, salaries for pasture manager and support staff, operation and maintenance of vehicles (tractor, truck and pick up), and establishment and maintenance of pasture fields. More than 40 tons of biomass was harvested from the pasture field, and vast area is also reserved for grazing small ruminants and calves during the dry season. The project procured and supplied 15 tons of groundnut hay, 5 tons of rice bran, assorted veterinary drugs, and weighing scales to the genetic improvement program.

The African Union Inter-African Bureau for Animal Resources (AU-IBAR) has also supported construction of new animal watering point and rehabilitation of bull mating pens at Keneba station. A new 4.5 inch bore hole was drilled fitted with solar operated pump machine, metallic

stand, plastic water tanks, and two watering troughs. The old dilapidated bull mating pen of six units has been completely overhauled and provided with a perimeter fence.

Demonstration crossbred dairy herd

This herd was established in the late 1990s to test for the survival and performance of F1 crossbred of N'Dama X Holstein/Jersey semen. It is a site for training farmers and excursion site for secondary and tertiary students. The herd comprises of 40 crossbred/back cross, 10 N'Dama and 40 goats. The herd is milked daily and collected fresh milk are sold to consumers at reasonable price. Although smaller than the previous year, the total volume of milk sold out in 2019 amounted to **4.46 thousand litres/kilograms** i.e. 4.46 tons of fresh milk. Produced manure were collected and utilized by farms within the Greater Banjul Area.

National, regional and International workshops

WALIC was ably represented in twelve events organised at national, regional and international level in 2019. It participated at two (2) national meetings, one (1) regional meeting, three (3) regional training of trainers' workshops, three (3) international conference, two (2) regional validation workshop, and one (1) continental launching of products. (1) national and three (3) regional workshops. Organisers of these events include the Ministry of Higher Education Research Science and Technology (MOHERST), WALIC and Ministry of Agriculture, Commonwealth Veterinary Association, African Union Inter African Bureau for Animal Resources (AU-IBAR), USA's Defence Threat Reduction Agency (DTRA), and American Society of Tropical Medicine and Hygiene (ASTMH).

Transformation process of ITC to WALIC

The Gambia government committed D1.121 million for the sensitisation of ECOWAS Commission and member states, and launching of the new WALIC Council. The permanent secretary of the ministry of agriculture, Mr Lamin Camara, led the sensitisation team of two officials to Senegal, Guinea, Ghana, Nigeria and ECOWAS Commission of agriculture, environment and water resources. Staff of WALIC and the ministry of agriculture organised the two-days' inaugural meeting of the WALIC Council attended by 10 members from the West African region, USA and Canada.

On resource mobilisation, a request letter was sent to the ECOWAS Commission to mobilize financial and technical support for the development of regional livestock program for West Africa. The proposal on National Dairy Program submitted to the ministry of finance and economic affairs was approved. Resources are now being mobilized from bilateral partners for its implementation.

Outlook for 2020

Activities prevue for the year 2020 include the continuation of started and new Research and Development projects such as genetic improvement, disease risk assessment, anticipated projects support activities, development of a regional livestock development program, and mobilisation of resources for the launching of WALIC.

Introduction

Although there were very limited financial and human resources available to the centre during the year 2019, major achievements were registered on the Research and Development agenda as well as the transformation process of International Trypanotolerance Centre (ITC) to West Africa Livestock Innovation centre (WALIC). As indicated in the Outlook for 2019 in the WALIC Annual Report 2018, the main work plan for 2019 consisted of the continuation of Research and Development activities as well as the transformation process of ITC to WALIC. This technical report is presented in four sections: 1) Research and Development activities, 2) Transformation process of ITC to WALIC, 3) Outlook for year 2020, 4) Conclusion, and 5) List of staff members.

Implemented Research and Development activities for the year 2019 are as follows:

- 1) Genetic improvement,
- 2) Projects support to the Open Nucleus breeding Scheme,
- 3) Screening of community N'Dama cattle herds,
- 4) Management of crossbred dairy cattle herd, and
- 5) Participation at national and regional workshops.

The outputs from these research activities benefitted several livestock farmers, researchers, extension agents, and decision makers. Results of research activities are shared extensively with stakeholders and partners. Selection of breeding bulls uses a young sire scheme that utilizes 36 months' performance records of candidate animals, their siblings, and dams milk production. Selected elite N'Dama breeding bulls, bucks and rams are disseminated to multiplier cattle herds, sheep and goat flocks around the country through the Gambia Indigenous Livestock Multipliers Association (GILMA).

Nema supported project activities are designed to strengthen the genetic improvement program through the provision of new animals, feeds, veterinary drugs and supplies, truck, tractor with accessories, pasture fields establishment, and training of the GILMA associations. Activities implementation are going on smoothly. Planned activities for 2019 included continuation of the establishment of pasture field and support to the management of the breeding herds and flocks.

The genetics project of AU-IBAR is supporting rehabilitation and construction of new structures to enhance performance of the breeding program. The old bulls mating pens at the field site in Keneba has dilapidated and the old bore hole and animal watering troughs are dysfunctional for several years. Restoring the functionality of the mating pens and installing new animal watering facility would enhance productivity of the breeding animals.

The transformation process of ITC to WALIC has reached a milestone of constituting a new regional Governing Council as the governance oversight body for the new Centre. Inaugurating this new Council is a priority action for this year. Once the Council is inaugurated, it would develop a road map for launching WALIC.

Outlook for 2020 would focus on continuation of on-going and new research and development projects (Genetic improvement, Nema project support activities, and national dairy development program), development of a regional livestock program for West Africa as well as the mobilisation of resources for the launching of WALIC.

1. Research and Development Activities

1.1 Genetic Improvement through Breeding and Selection for Elite Breeding males of Endemic Ruminant Livestock Breeds

1.1.1 Introduction

The breeding program was established at the West Africa Livestock Innovation Centre (WALIC) in The Gambia in 1994 with the goal of increasing milk and meat production without losing its tolerance to common diseases. The programme operates as an Open Nucleus Breeding Scheme with a three-tier structure: Nucleus, Multiplier and Farmer. The breeds of interest and of national relevance are N'Dama cattle, West Africa Dwarf goats and Djallonke sheep. Elite breeding males selected from the nucleus are passed on to the multipliers for multiplication and further dissemination of their offspring to other farmers.

Many routine and new activities for strengthening the WALIC genetic improvement program at Keneba were undertaken in 2019. Resource mobilization and partnership building with national and regional initiatives have been the key driving forces of the program throughout the year under reporting.

The day to day management of the nucleus herds and flocks including health and nutritional components alongside the breeding component ensures more effective and efficient flow of elite breeding males from the nucleus to the end users through multipliers. The herd health program adheres to routine and basic health practices designed to prevent and control enzootic diseases affecting ruminants locally. Local feed resources are being utilized to support physiological functions under the low input system which commensurate with local production systems at community level.

The centre has a well-established recording system to account for pedigree and other performance traits such as milk yield and daily gain, which are the core of the defined breeding goal. On a monthly basis, animals are weighed from birth through weaning and until 36 months of age. All weaned calves at 12 months of age are transported to a high challenge area of tsetse (Kudang area) until 36 months of age, when their breeding values are estimated

Under the project for Building Resilience against Recurrent Food Insecurity under the administration of the National Agricultural Land and Water Management Development (*Nema*) supported the centre in both strengthening the open nucleus and pasture. The essential infrastructure is in place. There is a laboratory to support diagnostics and the necessary office equipment for the collection, storage and process of data to aid management decisions.

The institution had also received support from other partners at continental level. In spite of numerous challenges, the centre continues to strive hard with some significant improvement towards desired outcomes.

1.1.2 Nucleus herd and flock structure at Keneba and Niamina

There are ten herdsmen assigned to the five herds. Their daily functions include herding, milking, help in the monthly weighing of all the animals, monitor and report cows in heat for mating, provision of feed supplements where necessary and stock checking. Five herders take care of the small ruminants.

For ease of management, monitoring and recording for data and genetic analysis, the herds have been divided into five herds. The herds comprise of calves, heifers, cows, teaser and breeding bulls. The teaser bulls have been vasectomised and are used for heat detection among heifers and cows on a daily basis. The composition of the five cattle herds, sheep and goats' flocks as of December 2019 is shown in tables 1 and 2. The heifers and young bulls under performance testing at Niamina East are also presented in table 1.

Table 1. Nucleus cattle herd structure and size

Herd	Calves	Heifers	Nema	Young Bulls	Cows	Teaser Bulls	Breeding Bulls	Total per herd
BB							6	6
Herd 1	14	7	13		24	1	.	59
Herd 2	17	4	19		22		.	62
Herd 3	18	6	12		22	1	.	59
Herd 4	16	6	18		19	1	.	60
Herd 5	11	4	18		22	-	.	55
Missra		14						14
Sambelkunda		15						15
Touba1				12				12
Touba2				6				6
Total Count	76	56	80	18	109	3	6	348

*NB about 40 Young Bulls were culled from TUBA1 and TUBA2

Table 2: Nucleus flock structure and size

Species	Does/ Ewes	Lambs/ kids	Rams/bucks >90 days old	Teaser bucks/ rams	Breeding Rams/bucks	Total
Goats	163	73	9	1	3	249
Sheep	95	30	10		3	138

1.1.3 Herd management

Herd management is the role of herdsman, field assistants and a senior animal breeder/geneticist at station level. The management process involves the following:

- Monitoring the activities of the teaser bulls every morning,
- Facilitate natural servicing of females in heat in a timely manner,
- Monitoring the health status of all animals,
- Provision of feed supplement to animals with very poor body condition score especially lactating cows,
- Separation of calves from their dams and supplement them with hay during the day time,
- Making sure that animals drink enough water, and
- Stock checking.

The following pragmatic interventions were instituted with the goal of improving the overall herd and flock management:

Calf Management: The overall calf management at the nucleus continue to improved substantially (see daily weight gain registered in 2019 in table 4) over the years. However, the centre experienced some high mortality among calves. A number of factors may be associated to such trend. One is the serious depletion of feed resources through bush fires consequently resulting to the deaths of lactating cows, hence subjecting their resulting young calves to being orphaned. Reduced number of herdsmen at the time was an important factor to consider.

In spite of all these conditions, birth weights of calves had improved. The calf holding area established in 2013 was maintained through the year 2019. This facility within the campus premises provided the calves enough shade, feed, and portable water *ad-lib*. Calves are admitted into the holding area when their dams are released for grazing and reunited with them for suckling upon return. This intervention reduced heat stress problems, allows better monitoring, reduced mortality rates, and produced healthier and stronger calves.

Mating System: Herdsmen and technicians as usual, were sensitized on the importance of getting actual dates of dam mating and the identity of mating bull used. This data is quickly fed into the database once it is collected. More vigilance was exercised in herding the dams in all herds to avoid mating by unknown bulls, and heat detection of dams coming into oestrus was intensified. Teaser bulls were released early each morning and upon return from herding to identify dams on heat. Dams on heat were randomly allocated to a breeding bull in the mating pen for a period of at least 48 hours.

Nutrition: The feed reserve base for the breeding stocks in the cattle nucleus herds and small ruminant flocks were beefed up by the end of the year in preparation for the critical months of the dry season in 2019. The yield from the pasture field was stocked in the feed store for use in the dry period of 2020. By the end of 2019, about 15 tonnes of groundnut hay was purchased and stored for use during the critical period of the dry season.

1.1.4 Data collection, entry and analyses

Data collection is a routine practice that provides essential information for analysis and improvement. It is the recipe for genetic analysis and the basis for estimating genetic parameters. Data obtained from the field is inputted into the WALIC Breeding Database by the Animal breeder/geneticist. Entering the data is timely and accurate to prevent the outliers in subsequent analysis. After entry, the data is checked for possible errors.

All entries are obtained from weekly records of different activities such as mating, calving, milking, exits/culling, entries, treatment and mortalities. Data on monthly weights, trypanosomosis infection status, and Packed Cell Volume (PCV) levels of cattle are also entered into the database.

- **Annual calving and mortality rate**

There has been steady increase in the number of calves born each year but increase in calf mortality rate from 2018 to end 2019. The trend had shown a decrease in birth through 2015 but increased in 2016 with higher mortalities. The year 2017 was a very critical year for the nucleus herds. There was a drop in total birth as shown in table 3. A high number of pregnant cows died and those that delivered shortly succumb to the disease (CBPP). Most orphaned calves could not survive. An increase in calving was realized in 2018 and 2019 but with higher calf mortality.

Table 3: Calving and calf mortality rate in 2019

Year	Total Births	Stock Actual			Calf mortality (%)
		Total	Male	Female	
2014	115	104	61	43	9.6
2015	62	57	25	32	8.1
2016	79	64	25	39	18.9
2017	45	32	11	21	28.8
2018	72	61	31	30	15.2
2019	76	76	48	28	28.0

There is a very significant number of calf mortality in 2019. This is attributed to a commensurate number of deaths of lactating cows by the end of 2018 into a very critical period of 2019, characterized by bush fires all over the grazing area, hence leaving very young calves orphaned. These calves at the time did not have the capacity to utilize forage. Those that survived bottle feeding had stunted growth. The stored feed could not sustain all the animals for the period. None the less, the stored feed contributed immensely to the survival of many. It will also be recalled that rainy season in 2019 started very late (end of July).

It is also important to note that the issue of CBPP may not be completely resolved, since some of the cows may be active carriers as manifested in previous Lab results. From records, 25 samples were collected in 2017, 6 samples were found to be positive of CBPP, and this constitutes 24% on extrapolation. The episode led to the deaths of 50% of the total population of cattle at the nucleus herds. In 2018, samples were further collected and there were still some positive samples. Field Assistants ensured vigilance to report and act on any CBPP case.

- **Weight at birth, weaning and gain**

The average calf weights at birth, weaning and average daily weight gain (ADWG) at 12 months of age over a four-year period are indicated in the table below:

Table 4: Weaning weights and average daily weight gains at 12 months

Year	Birth Weight (kg)	Weaning weight at 12 months (kg)	ADWG at 12 months (kg)
2016	17.0	74.9	0.16
2017	19.6	59.5	0.11
2018	16.8	62.9	0.13
2019	20.6	67.9	0.13

There had been a significant drop in weaning weight and average daily weight gain in 2017 but slightly increased in 2018 and 2019. Further increase is projected in 2020. The decrease over the years was attributed to the death of most dams when the calves were very young as a result of CBPP. Those that survived bottle feeding had very stunted growth.

- **Exits**

Table 5; Exits of cattle from the nucleus

S/n	Animal category	Quantity	Reason for exit	Remarks
1	Breeding Bull	1	Strangled	
2	Breeding Bull	1	Chronic Tryps	
3	Breeding Bull	1	Multiplier	Keneba
4	Young Bulls	18	Culled	Niamina
5	Young bulls	1	Tryps	Niamina
	Young Bulls	19	Multipliers	Niamina
6	Cows	3	Hyena Attack	
7	Cows	29	Mortality	
8	Heifer	5	Lost/stolen	
9	Heifer	8	Mortality	
10	Heifer	1	Emergency Slaughter	Niamina
11	Heifer	1	Mortality	Niamina
12	Heifer (Nema)	28	Mortality	
13	Calves	22	Mortality	

Deaths of some of the animals may be attributed to suspected contagious bovine pleuropneumonia (CBPP) disease, since some animals tested positive to CBPP antibodies. All the animals drink from the same source, hence a potential source of infection. Another batch of sample would be tested in 2020. Another important factor was the wrong timing of vaccination against CBPP, which was conducted in the stress period (March-June). Other factors contributing to the high mortality are feed shortages caused by bush fires. Two thirds of the grazing site of WALIC cattle was burnt.

- **Animal movement**

A total of 54 weaners were moved from Keneba station to Niamina during the year 2019. These weaners would be undergoing performance test under high tsetse challenge until the age of 36 months. Similarly, 28 mature heifers were moved from Niamina to Keneba station as replacement breeding females at the nucleus herd. The low number of transfers was as a result of restricted movement due to the outbreak of FMD in the whole country.

Table 6. Movement of various categories of livestock between stations

Animal Category	Origin	Destination	Number
Weaners	Keneba	Niamina	54
Heifers	Niamina	Keneba	28
Total			82

- **Mating and milk offtake**

Mating is recorded as it occurs by a designated bull to cows/heifers coming to heat. There have been a good number of cows mated in 2019. A total of 137 cows were mated. Only 7 cows repeated heat. It is expected that there will be a good number of births in 2020.

Weekly records for milk off take of individual lactating cows were recorded and the average morning yields by season are shown in table 7. Overall milk yield in all seasons had dropped compared to 2018. This is further explained by the harsh period in the dry season and long dry spelt. A number of lactating cows could not survive the condition resulting to deaths, leaving orphaned calves.

Low milk yield would also be attributed to genetic factors. Heifers are often replaced without being reinforced by screening for the whole program. There is currently an ongoing screening planned in the entire country to replace the breeding bulls, hence introducing new blood into the nucleus. The average took into account seasonal yield which may be extremely low in the dry season as in table 7.

Table 7: Average morning milk yield by season in 2019

Season	Average Morning Yield (ML)	Min (ML)	Max (ML)
Rainy Season (June-September)	535.8	50.0	2500.0
Early Dry Season (October-January)	670.4	100.0	2200.0
Late Dry Season (February-May)	234.4	50.0	1100.00

The total quantity of milk sold to the communities for consumption is 1741 Litres from September to December. This quantity does not reflect the total that could have been obtained from the cows on a daily basis due to some restricted milking of some cows to allow the calves to fully suckle their dams. Daily milking also did not start early due to the stress period the cows had undergone in the dry season characterized by lack of feed. For the purpose of performance in respect to milk yield, full time milking is only observed on every Thursday.

Price of milk from WALIC is way lower than the market price at community level.

1.1.5 Herd health interventions

The cattle herds were vaccinated against Black quarters and Haemorrhagic septicaemia, whilst the Small Ruminants were also vaccinated against Peste des Petites Ruminants (PPR) during the year 2019. All animals were strategically dewormed during the rainy season, while ectoparasite control, hoof trimming, and treatment of sick animals were carried out as required. Random blood and faecal samples were collected from the animals at Keneba and processed at the laboratory to determine infections, then followed by appropriate treatments.

All weaners, heifers and bulls at Niamina East district (Sambelkunda, Missra and Touba villages) undergoing performance testing for at least two years are bled every month to determine their blood packed cell volume (PCV) and trypanosome infection status. Breakdowns of the sampling results and treatments are shown in table 7.

Table 8. Number of cattle in Niamina herds weighed, sampled and treated monthly

Item	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
No. of cattle weighed	89	89	89	87	86	86	87	84	87	86	48	47
No. of blood samples	89	89	89	87	86	86	87	84	87	86	48	47
No. Positive for trypanosomes	9	0	1	1	0	0	16	9	11	11	13	15
Trypanosomes infection rate (%)	10.1	0.0	1.1	1.1	0.0	0.0	18.4	10.7	12.6	12.8	27.1	31.9
No. treated for tryps with PCV < 20%	10	7	1	1	4	3	14	10	10	24	18	4

1.2 Projects in Support to the ONBS

- *Nema Project*

Pasture Development and Support to the ONBS

The support of *Nema* from 2018 through 2019 was characterised by high level of commitment on both the side of the project and WALIC, through a signed MOU between the two parties. Under the agreement, in 2019, the project reinforced the nucleus herds and flocks with 15 tonnes of groundnut hay and 5 tonnes of feed supplement. Stock of drugs, weighing scales to facilitate monthly weighing have also been purchased by the project

The pasture component of the station is divided into two. One is a ten-hectare size, to be developed under the framework of the signed MOU with the Nema project and the other component is an old establishment that is functional with irrigation system. There is a ten-hectare field that is under development through the support of the project. This year, a total of 4 hectares of the ten hectares have been developed partially. Some exotic pasture seeds (Brachiaria and panicum) were imported and sown in two hectares of the new establishment by the project.

However, since the new field is yet to be fully developed with irrigation facility, about six hectares of the old field have been re-ploughed, sowed with the exotic brachiaria seeds. As a result, WALIC reinforced this component by overhauling it with a more efficient irrigation system to ensure availability of water in the dry season.

The yield from the new field was about 40 tonnes of biomass. Unfortunately, the new field was not harvested due to late development, hence resulted to suboptimal growth. None the less, it is envisaged that continuous irrigation will enable the grass to grow optimally and could be utilized directly by grazing animals especially calves and young males.

As we are in the last year before the end of the project, the irrigation system of the new fields should be installed as soon as possible. By the mid of the year 2020, ten hectares of both the new and old fields will be sown with seeds and managed for future use.



Figure 1: Harvesting of Panicum grass



Figure 2: Drug Supplies



Figure 3: Concentrate and Monthly weighing

- ***AU-IBAR Genetics Project***

The African Union Inter-African Bureau for Animal Resources (AU-IBAR), signed a contract with a Gambian contractor to rehabilitate the bulls mating pen and drinking facility of the nucleus herds. The construction work is now complete and is being fully utilized.



Figure 4: Drinking Facility and Bull Pens

1.3 N'Dama Screening Program Financed by WALIC

Selection is used to make long-term genetic change in animals. It is the process that determines which individuals become parents, how many offspring they may produce, and how long they remain in the breeding population. Since the program continued to select and disseminate young bulls to multipliers, it has not conformed to the major principle of introducing new blood (males) into the nucleus. This may have some major setback for the breeding program for the fact that selection in the long run may reduce heritability of traits and hence reduced variance due to selection (Bulmer effect). This means that there will be high selection intensity (selection in small groups of candidates), correlated index values of candidates.

As a result, screening for outstanding cows was planned and implemented within 2019. The following objectives have been set for implementation

- To identify and select the offspring of high yield (milk) cows in the country

- To increase the participation of cattle owners in the breeding program
- To sensitize participating cattle owners on the importance of introducing new blood into cattle herds.
- To increase milk offtake of the N'Dama

Village screening is being performed to identify outstanding cows in relation to milk yield during and after the main calving season (August 2019 to March 2020). The project is expected to screen about 500 to 1000 cows in country. After weaning, male offspring of the outstanding cows will be purchased and placed with other animals of the same age for performance testing in Niamina East. The purchase of the animals will be in 3 different phases. The first phase will cover herds in two regions and will run for one year. This will be followed by the second and third phases. This means that the project will run for three years. cows calving between July and October will be included, the cows will be ear-tagged, milk-offtake will be measured once a week by trained milk recorders for 100 days, milk recorders will come from the participating villages and will be contracted and paid, herd owners will received incentives to participate (Ropes and health care).

In the first phase of the program, there has already been over 1000 observations on milk yield with over 150 birth records. The first phase is expected to be finalized by the end of March 2020.

Challenges affecting the ONBS

Some of the most important challenges to the nucleus and the program are as follows:

1. The continuous destruction and depletion of feed resources through bush fires and perhaps some hyena attacks.



Figure 5: During Fire outbreak



Figure 6: After bush fires

2. Hyena attacks



Figure 7: Hyena Attack in a completely depleted environment

3. Housing and infrastructure

The housing condition of the staff on station needs some urgent attention. This will further motivate the staff and comfort within the working environment

To alleviate the interrupted supply of electricity, solar energy will be greatly helpful.

The fuel supply to the station should be increased to accommodate pumping of water to the pasture fields.

1.4 ONBS 2019 Outputs

The breeding programme has realized major outputs/results during 2019 in the form of elite breeding males, milk offtake for food, data from the screening activity, and large number of offspring at the multiplier tier.

Fourteen **(14) breeding bucks** and nineteen **(19) breeding bulls** were selected for dissemination to the multiplier tier at community herds level. Eight (8) bucks are currently serving as breeders in different communities on both banks of The Gambia. Similarly, the bulls are also being disseminated through the Gambia Indigenous Livestock Multipliers Association (GILMA) to various community cattle herds to service the cows present. On the flip side of the selection program, **18 young bulls culled** from the Niamina herds bound for fattening and slaughter would contribute to the meat offtake available to the country.

On contribution towards food security, the nucleus herd of the breeding scheme was able to add **1,741 litres of fresh milk** available to the local community during a four-month period September-December 2019. This amount of milk would go a long way at improving the nutritional status of the community.

Disseminated service bulls at the community herds were found to have sired **117 young bulls** with a present monetary value of over D2 million dalasi which shows its potential of reducing rural poverty. Lot of young heifers are also sired by these bulls which would increase the number of breeding females present at the multiplier herds.

1.5 Demonstration Crossbred Dairy Cattle Herd at Headquarters

There are two cattle herds and a flock of goats in WALIC headquarters- Kerr Serigne. The first herd is composed of backcrosses and the second one is composed of N'Dama cows, backcrosses and F1s (Holstein-Friesian x backcrosses) as shown in table 1 and figure 1. The purpose of these herds is to serve as demonstration of livestock models that could be adopted by different categories of farmers at peri-urban areas of The Gambia for income generation, milk and meat production. In addition to revenue generation for the centre, the N'Dama cattle herd and goat flock also produce replacement breeding females for the nucleus herd and flock at WALIC Keneba field station.

Table 1. Cattle herd and goat flock composition

Category	N'Dama	F1/Backcrossed	Goat flock
Mating male	0	0	0
Breeding females	4	15	19
Calves/Kids	4	8	21
Weaners	0	0	0
Young bulls/bucks	1	5	0
Heifers/young females	1	12	0
Herd/Flock size 2019	10	40	40



Figure 1. Crossbred dairy cattle

Main activities implemented in 2019

- *Monthly weighing*

All station animals are weighed at the end of every month to determine weight gains/losses and body condition and results incorporated into the database

- *Daily milking and milk measurement*

Milking is done twice daily in the morning and evening; off-takes are measured and recorded into the database. Due to very few calving by end of 2018, the volume of milk off-take consequently dropped significantly as most the dams remain dry and or open for most parts of the year. Hence the total milk off-take made available to the consumers by end of 2019 equalled to **4,461.5 litres** with a monetary value of **D178,460**. The farm has therefore contributed 4.46 tonnes of milk towards food security through crossbred dairy cattle production.

- *Supplementary feeding*

Animals are supplemented with groundnut cake, rice-bran and spent brewer`s grain from Banjul Breweries to provide them with energy, protein and other essential elements required for maintenance and production

- *Vaccination*

Cattle are vaccinated against Black quarters and Haemorrhagic Septicaemia diseases, and goats against Peste de Petit Ruminants (PPR) disease

- *Deworming*

This activity is done in July, September and October i.e. 3 time per year.

- *Spraying*

Sprayed all animals using acaricides (Antitic and Pour -On) in July, August, September and October to control ecto-parasites.

- *Data collection and entry*

Data collected from all these activities is recorded and entered into the database. Captured animal entries, exits and movements are presented on table 2.

Table 2. Entry and Exit

Animal Category	Calving/Kidding	Mortality	Sold/cull	Lost	Movement
N`Dama	2	0	1	0	0
F1/Back Cross	8	2	6	0	0
Goats	17	11	5	0	0
Total	27	13	12	0	0

- *Feed purchasing*

This involves irregular supply of spent grain from Banjul Breweries with no cost apart from compensating them with 3 litres of milk for each supply we receive from them. Apart from the spent grain, the centre also buys ground-nut cake, rice-bran and groundnut hay.

- *Feed collection*

Station labourers cut and collect Andropogon and maize stovers from the surroundings and Radville Farms at Nema kunku, respectively.

- *Random blood and faecal sampling*

This is done at random periods. When an animal is sick or has an undesirable condition, blood or faecal sample is collected and processed to determine its condition.

- *Pasture production and utilization*

20mx20m area was cultivated with *Panicum maximum* grass by station labourers as an extension of pasture production on station. When the grass reached a certain height, calves were introduced to it for grazing. Due to lack of proper fencing, this activity is pending.

- *Artificial Insemination*

This activity was carried out on station with semen from exotic breeds (Holstein-Friesian) to produce crossbreeds with higher milking capacity for revenue generation and food security. All the 14 inseminated cows on 21st February 2019 had conceived. The insemination exercise resulted into seven (7) female crossbred calves in November 2019; one still birth, and one fatal dystocia case in December 2019. Samples of born crossbred calves shown in figure 2 below:



Figure 2. Crossbred calves from artificially inseminated dams (AI)

- *Treatment:*

This happens when an animal gets sick or has an undesirable condition. Conducted health intervention activities and treatments are summarised in table 3 and 4.

Table 3. Health intervention activities

Activity	Period: Year 2019											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Weighing	x	x	x	x	x	x	x	x	x	x	x	x
Deworming							x		x		x	
Spraying						x	x	x	x	x	x	
Vaccination						x						x
Milking	x	x	x	x	x	x	x	x	x	x	x	x
Supplementation	x	x	x	x	x	x	x	x	x	x	x	x
Data collection	x	x	x	x	x	x	x	x	x	x	x	x
Cows artificially inseminated		14										
Treatment	Whenever there is disease condition or sick animal											

Table 4. Treatment records- 2019

Diseases	Period											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Helminths							3					
Skin infections	9		1	11	2	2	35	23	28	2	2	
Mastitis		1							2			
Wound/abscess			1		2		1		8	1	4	3
Abortion			1					2				1

Although this herd is not operated for profit, its draft financial statement presented on table 5 shows a deficit of 289,736 Dalasi. This deficit is due to the smaller volume of revenue earned compared to incur expenditures. The main reason for this scenario is due to fewer lactating dams, very long calving interval, and feed shortages compared to 2018. Main cause of the long calving interval was due to the return to heat of cows inseminated during the training of AI technicians held in November 2017 and subsequent inseminations done in 2018.

Table 5. Financial statement of the farm in 2019

Expenditure		Revenue	
Item	Amount (D)	Item	Amount (D)
Groundnut hay	25,000	Fresh milk	178,460
Groundnut cake	34,500	Manure	350
Rice bran	21,000	Culled animals	30,860
Salt	1,000		
Casual labour	113,350		
Drugs	27,000		
Fuel for feed collections	12,000		
Car maintenance	33,510		
Herdsmen salaries	232,046		
Totals	499,406		209,670
Surplus/deficit	(289,736)		

1.6 National, Regional and International Workshops

WALIC was ably and effectively represented by either Dr Arss Secka, Mr Omar Jeng, Mr Momodou Jeng, Mr Lamin Darboe or Mr Lamin Camara at the following national and regional workshops organized within 2019:

Table 1. List of attended workshops

Sn	Conferences/ workshops	Period	Venue
1	MOHERST National Innovation Systems workshop sponsored by African Observatory for Science Technology and Innovation of African Union	21-23 rd January 2019	Banjul, The Gambia
2	Pan Commonwealth Conference organized by Commonwealth Veterinary Association	1 st -7 th March 2019	Bangalore, India
3	Training of Trainers Workshop for Harmonizing Characterization-Inventory-Monitoring tools for Africa organized by AU-IBAR	11-14 th March 2019	Nairobi, Kenya
4	Validation of Animal Health Bill 2019 funded by AU-IBAR	15-17 th May 2019	Banjul, The Gambia
5	Launching of State of Farm AnGR of Africa, CIM tools and ARIS3 organized by AU-IBAR	12-13 th June 2019	Nairobi, Kenya
6	Training of trainers on Animal Genetic Resources Information System (AAGRIS)	17 th – 19 th June 2019	Naivasha, Kenya
7	Training of trainers on Access and Benefit Sharing workshop (ABS)	20 th – 22 nd June 2019	Naivasha, Kenya
8	Science Review Program of Defence Threat Reduction Agency's Biological Threat Reduction Program	17-20 th September 2019	Warsaw, Poland
9	Validation of African Technology and Innovation hub proposal organized by AU-IBAR	21-23 rd October 2019	Nairobi, Kenya
10	WALIC Council inaugural meeting	29-30 th October 2019	Banjul, The Gambia
11	Monkey pox Surveillance Network meeting	17-20 th November 2019	Washington, USA
12	Sixty-eight annual meeting of the American Society for Tropical Medicine and Hygiene (ASTMH)	20-24 th November 2019	Washington, USA

2. Transformation process of ITC to WALIC



2.1 Sensitisation of countries and institutions

A two-man team comprising of Mr Lamin Camara, Permanent Secretary, Ministry of Agriculture, and Dr Arss Secka, Officer-In-Charge, West Africa Livestock Innovation Centre (WALIC) undertook sensitisation mission to some ECOWAS member states and ECOWAS Commission through two-legged mission. The first leg of the mission covered Senegal's Ministry of Livestock and Animal Production, and Guinea's Ministry of Livestock from the 6th to 9th August 2019. CORAF/WECARD was targeted but could not be realized as the executive director was on mission abroad. The second leg of the mission conducted on 19th to 24th August 2019 covered ECOWAS Commission for Agriculture, Environment and Water Resources, Abuja, Nigeria; Federal Ministry of Agriculture and Rural Development, Abuja, Nigeria; and Ministry for Food and Agriculture, Accra, Ghana.

The main purpose of this mission was to sensitize selected ECOWAS member states, institutions and the ECOWAS Commission for agriculture on the processes of launching WALIC. Specifically, the mission undertook meetings to garner support for the operationalization of WALIC. Meetings were planned with the following institutions:

- Ministry of livestock and Animal Production in Dakar, Senegal
- Ministry of Livestock in Conakry, Guinea;
- ECOWAS Commission for Agriculture, Environment and Water Resources, Abuja, Nigeria;
- Federal Ministry of Agriculture and Rural Development, Abuja, Nigeria;
- Ministry for Food and Agriculture, Accra, Ghana.

The main outcomes from this mission include the following:

- Key stakeholders in four ECOWAS member states, ECOWAS Commission for agriculture, and the Gambia High Commission Nigeria are updated on the processes of launching WALIC;
- In principle, all visited countries and ECOWAS are supportive of WALIC processes and looking forward to participate in the forthcoming Council meeting slated for October 2019;

- A good plan to mobilize resources from ECOWAS for developing a regional livestock development project for member states within the community was curved out; and
- The long-stalled transformation process of ITC to WALIC was revitalized thus rekindling keen interest from sister countries and partner institutions.

The main recommendations after the mission were as follows:

- The proposed request letter for the ECOWAS Commission president should be quickly written and send through DHL by the first week of September 2019;
- Invitation letters for the WALIC council members should be sent out latest by the second week of September 2019;
- Either Mali, Sierra Leone or Guinea Bissau should be sensitized and invited as member to the new WALIC Council;
- A regional non-governmental organization working on livestock should be identified, sensitized, and invited as member to the WALIC Council;
- Follow ups on the draft MOUs should be intensified so that they could be finalized and signed up to during the council meeting; and
- The team also needs to reach out to CORAF/WECARD to bring them up to the same level as the visited four countries.

All proposed recommendations/actions were implemented; and Guinea Bissau was finally added to the membership of the new WALIC Council.

2.2 WALIC Council Inaugural meeting



Photo: WALIC Council members plus 3 WALIC staff on 29th October 2019

WALIC is established by an Act of parliament of the Gambia government called WALIC Act 2016 which also establishes a governing Council to provide strategic advice and guidance for the operation of the Centre. The 15-member Council comprises of regional representatives mainly from West African member states, institutions, organizations and technical experts.

Membership of the Council consist of the Minister of agriculture of the Gambia or his/her delegation, Director of AU-IBAR, Commissioner of the ECOWAS Commission for agriculture, environment and water resources, Executive Director of CORAF/WECARD, Decision makers from five ECOWAS member states, regional farmer organization, regional Non-Government Organization, and four experts. As the Centre strives to be fully operational, it is therefore paramount to make the Council functional to drive the processes of programming, resource mobilization, and overseeing implementation of approved annual work plans of the Centre.

The objective of this meeting was to induct the new WALIC Council members and conduct the first meeting that would lay down the process of operationalizing the Centre.

The first WALIC Council meeting was held on the 29-30th October 2019, at WALIC Conference hall, Kerr Serigne, Banjul, The Gambia. Twelve council members present at the meeting were: Mr. Lamin CAMARA, permanent secretary, ministry of agriculture, Gambia.; Dr. Mohamad FOUAD representing ECOWAS Commissioner for Agriculture, Environment and Water Resources; Dr. Dame SOW representing Senegal's minister of livestock and animal production; Dr. Daoda BANGOURA representing Guinea's minister of livestock; Dr. Bernardo CASSAMA representing Guinea Bissau's minister of agriculture and forestry; Dr. Sagre BAMBANGI representing Ghana's minister of state for livestock; Dr. Aliyu Chafe DANLAMI representing Nigeria's minister of agriculture and rural development; Mr. Gordi HAMMADOU representing ROPPA; three experts – Prof Olanrewaju SMITH, Dr. Assan JAYE, and Dr Bonto FABURAY; and Dr. Arss SECKA, OIC WALIC as ex-officio member. WALIC staff, print and electronic media, drivers and caterers facilitated the meeting.

The meeting was started with an opening ceremony, followed by presentations with discussions, chatting of the way forward for the full operationalization of the Council and WALIC, conducted tour around the Centre, staff briefing and ended with a closing ceremony.

Final communique of the meeting is summarized as follows:

- The Council is highly convinced that the infrastructure for research and innovation available at WALIC stations such as laboratories, office complex, houses, and animal farms are so valuable that it should never be left to dilapidate. The structures should be brought up to date for use by stakeholders in the livestock sector within the ECOWAS region;
- The Council is commending the Gambia government for its will and benevolence to put this Centre to the common use and co-ownership by ECOWAS member states, and for maintaining and preserving the assets and skeletal staff throughout the long transformation process to the operationalization of WALIC. The Council is therefore recommending that Gambia Government should continue providing more incentives to the staff on board until such time that the Centre is fully funded and operational;
- In recognition of the many efforts, energy and resources spent so far on the transformation and operationalization process of WALIC, Council is recommending that it should continue to pursue the path of developing bankable regional livestock programs and projects that would be used to mobilize resources for implementation in ECOWAS member states through the support of ECOWAS Commission;
- The advocacy and sensitization of ECOWAS member states should be intensified by the government of The Gambia to get buy-ins of more countries for the recognition of WALIC as a regional Centre of excellence and technical arm of ECOWAS Commission on livestock. The support of WALIC Council and ECOWAS Commission are needed in this process; and

- Finally, the Council wish to thank the Government of The Gambia for spearheading and financing the holding of this successful inaugural council meeting and supporting the transformation and operationalization of WALIC.

2.3 Mobilisation of financial resources

Having realized that the allocated monthly government subvention cannot finance all needs of the Centre for its full operations, project proposals were written and submitted for funding. An application for FAO-TCP was sent to the FAO representation office to The Gambia in October 2018. It is entitled *strengthening the capacity of West Africa Livestock Innovation Centre and characterization of local livestock breeds*. Expected two (2) main outputs to realize are: 1) WALIC becomes functional and operational, and 2) local indigenous food animals and poultry breeds in The Gambia are characterized at phenotypic and molecular levels. It was followed up during 2019 but did not succeed at getting it funded.

Another proposal entitled *National Dairy Programme for Food Security and Sustainable income generation* was submitted to the AID Coordination Directorate of the Ministry of Finance and Economic Affairs (MOFEA). This was reviewed and accepted by the strategic board after effecting some changes on the proposal. This programme is expected to contribute significantly towards the attainment of the National Development Plan (NDP) priority target of increased dairy production. Set target of the NDP is to increase dairy production from 811 metric tonnes to 30,000 metric tonnes by 2021.

Expected results from this programme include 1) increased farmers' access to high producing pure breed dairy animals; 2) dairy infrastructure and equipment capacity improved; 3) capacities of beneficiaries enhanced; 4) pasture fields established for promotion of intensive livestock management; and 5) milk processing and packaging plant established. Needed budgetary requirement is USD5 Million, which would be mobilized in early 2020 by MOFEA from bilateral partners.

The government of the Gambia through its ministry of finance and economic affairs provided D1.121,400 million (one million one hundred and twenty-one thousand and four hundred dalasi) to WALIC for holding the inaugural meeting of its newly constituted governing Council. Six hundred and thirty-four thousand seven hundred and ninety-six dalasi and 32 bututs (D634,796.32)) was also received by WALIC as support from Nema to finance the sensitisation mission to ECOWAS Commission and five member states. Overall raised financial resources from GOTG for sensitisation missions and Council meeting amounted to D1,756,196.32 in 2019.

3. Outlook 2020

3.1 Research and Development Activities

3.1.1 Genetic Improvement programme

All of the activities currently being carried out at all the field stations (Keneba, Kudang and Sololo) would be continued in pursuit of our efforts to improve the performance of the three ruminant livestock breeds (N'Dama cattle, Djallonke sheep and West Africa Dwarf goat) without affecting their resistance to a number of diseases or reducing their adaptability to the environment in which they have thrived well over several generations. These animals constitute a valuable animal genetic resource for millions of livestock producers in the region. The

dissemination of main outputs from the breeding programme in the form of improved breeding bulls, bucks and rams to multiplier livestock farmers would be continued in 2020.

There has not been introduction of new breeding bulls from the community herds into the nucleus herd for more than a decade now. The Open Nucleus Breeding Scheme (ONBS) is designed to have periodic introduction of new sires from outside into the scheme. Having initiated the screening programme in 30 community cattle herds in 2019, additional 30 community cattle herds would be targeted in 2020.

3.1.2 Nema project support

The activities that were planned for 2019 but not realized would be taken up in 2020. Hence, we expect that the solar operated irrigation system would be installed to facilitate irrigation for pasture development and growth during the long dry season. New additional pasture field established within the fenced 10-hectare fields at Keneba station would be further developed during the 2020 rainy season.

3.1.3 National Dairy Programme

Funding for the proposal on *National Dairy Programme for Food Security and Sustainable income generation* is expected to be effective in 2020. The goal of this programme is to contribute to the attainment of the National Development Plan (NDP) priority target of increased dairy production. Programme's objective is to increase dairy production for food and generate income for beneficiaries.

3.2 Transition to WALIC

WALIC would continue to mobilize resources through partnership and collaboration with the governments of member countries, CORAF/WECARD, and ECOWAS commission. The newly installed WALIC governing Council would continue to provide guidance and leadership towards the full operationalization of WALIC in 2020.

4. Conclusion

Substantial achievements on research and development activities were attained as per the small staff size and limited financial resources available for the Centre's operations. The genetic improvement program is progressing well. Eight improved/elite breeding WAD bucks were disseminated to the multiplier tier in 2019, and 18 improved breeding bulls were also selected out of the nucleus tier that are set for dissemination to the multiplier tier.

All lined up activities for implementation under the Nema project have been realized except for the installation of solar operated irrigation system and remaining five hectares of pasture yet to be established. The draft National Strategy and Action Plan (NSAP) for the management of animal genetic resources has now been validated. Following the endorsement of the document by the ministry of agriculture, the final version would be printed and circulated to stakeholders in early 2020.

The proposal on *National Dairy Programme for Food security and income generation* has been approved by the strategy board of the ministry of finance and economic affairs as one of the NDP flagship projects for which funds are to be mobilised for its implementation.

The main success on the revitalization and transformation process of ITC to WALIC in 2019 was the sensitization of ECOWAS Commission and five member states, and the inaugural meeting of the new WALIC Governing Council. With the expected technical and financial support to WALIC from ECOWAS Commission in 2020, a regional livestock development program would be elaborated and funds mobilized for its implementation.

5. WALIC Staff List as at 31st December 2019

No.	SN	Title	NAME	POSITION HELD
Kerr Serigne Station				
Finance & Admin. Staff				
1	1	Dr	Arss Secka	Officer-In-Charge
2	2	Mr	Omar Jeng	Senior Accountant
3	3	Mrs	Fatou Bittaye	Accounting officer
4	4	Mrs	Rokiatu Cole Cham	Admin. officer
5	5	Mr	Sheriffo Kanteh	Senior Driver
6	6	Mr	Ebrima Sohna	Driver
Support Staff				
7	7	Mr	Amadou Keita	Lab Technician
8	8	Mr	Lamin Camara	M & E Officer
9	9	Mr	Samba Gaye	Electrician
10	10	Mr	Ousman Barrow	Cleaner
11	11	Mr	Sajar Drammeh	Cleaner
12	12	Mr	Alieu B Cham	Gardener
13	13	Mr	Abdou Touray	Security Guard
14	14	Mr	Lamin L. Jammeh	Security Guard
15	15	Mr	Alagie Jammeh	Security Guard
16	16	Mr	Musa Cham	Security Guard
17	17	Mr	Omar Manjang	Security Guard
18	18	Mr	Omar Jammeh	Security Guard
19	19	Mr	Pa Omar Tunkara	Security Guard
20	20	Mr	Biran Corr	Security Guard
21	21	Ms	Mariama Faburay	Security Guard
22	22	Mr	Lamin K Darboe	Sen Livestock Assistant
23	23	Ms	Fatou Janneh	Livestock Assistant
24	24	Mr	Sainey Fatty	Herdsman
25	25	Mr	Alagie Mbye	Herdsman
26	26	Mr	Adama Kujabi	Herdsman
27	27	Mr	Mustapha Badjie	Herdsman
28	28	Mr	Kawsu Jawara	Enumerator
29	29	Mr	Kutubo Bojang	Daily paid labourer
30	30	Mr	Ousman Sillah	Daily paid labourer
31	31	Mr	Bakary Gibba	Daily paid labourer
32	32	Mr	Wuyeh Sanyang	Daily paid labourer
33	33	Mr	Ello Jallow	Daily paid labourer

Keneba Breeding Station				
Operation Staff				
34	1	Mr	Momodou Jeng	Station Manager
35	2	Mr	Yusupha Wally	Livestock Assistant
36	3	Mr	Omar Marong	Tractor Operator
37	4	Mr	Sheriffo Sanyang	Truck Driver
38	5	Mr	Ansumana Jarju	Field Assistant
39	6	Mr	Tijan Tamba	Field Assistant
40	7	Mr	Ebrima Kolley	Field Asst.
41	8	Mr	Lamin Ceesay	Herdsman
42	9	Mr	Lamin Marri	Herdsman
43	10	Mr	Fabakary B Ceesay	Herdsman
44	11	Mr	Fabakary Drammeh	Herdsman
45	12	Mr	Kebba Jallow	Herdsman
46	13	Mr	Jamanty Ceesay	Herdsman
47	14	Mr	Alagie J Bah	Herdsman
48	15	Mr	Masanneh Bah	Herdsman
49	16	Mr	Alkali Kebbeh	Herdsman
50	17	Mr	Kulayma Sillah	Herdsman
51	18	Mr	Sunkaru Manneh	Herdsman
52	19	Mr	Abdoulie Minteh	Herdsman
53	20	Mr	Pateh Humma	Herdsman
54	21	Mr	Hamadi Camara	Herdsman
55	22	Mr	Hamat Gassama	Herdsman
56	23	Mr	Fanding Ceesay	Security Guard
57	24	Mr	Saidy Ceesay	Security Guard
58	25	Mr	Demba Njado	Security Guard
59	26	Mrs	Tumbul Samateh	Cleaner
60	27	Mr	Cherno Danso	Watchman
Bansang / Sololo Station				
Operation Staff				
61	1	Mr	Modou S Gaye	Station Manager
62	2	Mr	Lamin Jamanka	Herdsman
Support Staff				
63	3	Mr	Falai Dampha	Security Guard
64	4	Mr	Lansana Jarra	Night Watchman
65	5	Mr	Momodou Fatajo	Day Watchman
66	6	Mr	Kalifa Touray	Night watchman
67	7	Ms	Rohey Jagne	Cleaner
68	8	Mr	Samba Buwaro	Laborer
69	9	Mr	Amadou Baldeh	Laborer
Kudang sub-station				
Operation staff				
70	1	Mr	Lamin F Ceesay	Senior Livestock Assist.
71	2	Mr	Alagie Bah	Herdsman

72	3	Mr	Alonso Sidibeh	Herdsman
73	4	Mr	Madi Camara	Herdsman
74	5	Mr	Sulayman Baldeh	Herdsman
75	6	Mr	Sheriffo Bayo	Herdsman
76	7	Mr	Bakary Drammeh	Cleaner