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AGENCY FOR INTERNATIONAL DEVELOPMENT

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PROJECT NO. 698-0135

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PREPARED BY. H. E. CARVER, D.V.M.

SUBJECT: THE SERUM AND VACCINE INSTITUTE
MOGADISCIO, SOMALIA

JANUARY 5, 1979

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INTRODUCTION

The agreement under which the Consultant came to Somalia asks for specific answers to immediate problems which will be in turn addressed. In familiarizing himself with these problems, he came to see them as a part of the much larger problem area of people, organization and management. This problem area can be corrected and as this is carried out, the solution of problems which arise basically from this area will largely sort themselves out.

In preparing this report, major components will be described and suggested measures offered for correction or improvement of problems seen. The author will in all instances offer what he believes to be a practical, workable approach, rather than several alternatives.

The Consultant has been pleasantly surprised at the atmosphere of cordiality and frankness he has encountered in government offices. It is an obvious fact that in order to correct a situation, it is necessary to first recognize that a problem exists.

An atmosphere of frankness in the discussion of problems makes the possibility of reaching a solution much more feasible. Coupling the recognition of a problem with a desire to correct it is a big step in the solution of the difficulty.

This report will be frankly critical of problems seen and as it progresses offer solutions of a constructive nature, as the Acting Director General of the Ministry of Livestock, Forestry and Range has requested.

THE LIVESTOCK SITUATION

This report cannot attempt to other than very briefly review the livestock situation in Somalia. Obviously the present livestock situation is the culmination of a largely undirected but profitable growth of an industry over a period of many centuries. It is only in the last few years' span that government has taken interest in its improvement.

The Government of Somalia recognizes that this livestock sector of the economy is vitally important to the future of the country. This sector which contributes some 75 percent of the gross national product must be improved and protected. Numerous programs have been or are in the process of being started that are directed toward the goal of livestock industry improvement. The Somalia government is expending a large amount of its budget directly or indirectly toward this goal and is actively seeking and receiving assistance from a wide variety of outside donor sources.

It is extremely important and it cannot be overemphasized that these internal and external resources must be judiciously applied and coordinated through the execution of very high quality project plans. Meticulous planning is a very important first step. It is of utmost importance that the goals or objectives of the projects be realistic and within the reach of the timeframe presented. These goals should be clear, concise and recognizable as filling a practical need of the country. Overly ambitious projects tend to failure. In other words, the project goals should be (1) something Somalia vitally needs, (2) workable, (3) within the capability of the assigned personnel and (4) wanted by the Somali people. If it can meet these criteria, it has a high probability of success.

In facing the problems of the livestock industry, one may recognize the enormity of the job to be done when the extent of the animal population is estimated as not less than 33,850,000 animals and directly involves nearly half the human population of the country. One then realizes the extremely hazardous condition that exists knowing that this animal population has been only partially protected against diseases. A growing number of younger cattle are not immune to Rinderpest, for example.

The Government of Somalia recognizes these hazards in placing high priority on its Serum and Vaccine Institute and on enlargement and improvement of the field services' arm of the Ministry.

It has been estimated that an annual offtake from the animal population reaches the level of 6-7 percent. Undoubtedly, a large contributor to this low level offtake is in the realm of animal disease. Disease results can take many forms other than high mortality losses. Disease conditions can and do affect the utilization of nutrients, the rate of growth, weight gain, age of maturity, reproductive ability, sexual maturity, quality and quantity of the final product. Well-directed and effective efforts in disease prevention and control can, then, have a direct and impressive effect on the annual percentage of offtake as well as quality of final product.

The problem area presented so briefly is of enormous scope and importance. A carefully planned, meticulously applied approach to the problem is necessary. Since the problem is so large and since there is a limit to the resources, both financial and personnel, that may be utilized, it is suggested that the greater effort be concentrated in areas of high animal population density, and higher unit valuation in the beginning. It would be wise to select the best, most experienced

personnel for these areas, using them additionally to train other personnel both professional and semi-professional who would be used in enlarging the program to other areas. In this manner a more sound foundation will be built for future operations. In any case, maintenance of the status quo in containment of animal disease epidemics must be maintained in the remaining areas of the country.

FIELD SERVICES

The Field Services Division of the Department of Animal Health is the field delivery arm of the Ministry. It functions as the agency to carry out year-round vaccination programs, front-line surveillance of disease, diagnosis and treatment of animal disease conditions. Thus, it is an extremely important functional entity of the Ministry. As such, it is necessary that the Ministry place sufficient emphasis and priority on the improvement of both its personnel and physical facilities in order to develop the highest possible reliability. A less than reliable level of competency means that the Ministry and the livestock industry become vulnerable in the matter of disease surveillance and possible failure of the disease control delivery systems. Such a failure could result in severe animal losses that could be prevented.

Three recommendations are in order. First, it would be well to arrange that an outside team be obtained to make a careful study of this agency and report on the deficiencies found and recommend corrective measures to be followed. Secondly, a carefully-planned upgrading of all personnel should be made based on a thorough continuing education program for the professional and sub-professional personnel. This could be carried out during vacation periods at the Livestock Training School utilizing both key Somalian staff as well as foreign professional staff. This should be a continuing program throughout the years in order to keep the field staff up-to-date on newer developments and as a means of maintaining morale in the service. Thirdly, it is further recommended that at least two of the most outstanding veterinarians from this service be sent annually for additional veterinary education in the fields of diagnosis of disease, diagnostic methods and epidemiology. These men could then become, on their return, heads of their regional services.

It should be possible to bring in the 233 veterinary assistants and 28 veterinarians in a phasing sequence that will least disrupt field services. The emphasis of the government on increasing the field services by assigning raw, newly graduated veterinarians to the services would make this program doubly important and lend urgency to the startup.

Emphasis should be placed on diagnosis, diagnostic methods, accurate record keeping, submission of useful samples to the Vaccine Institute as well as submitting complete information on sample material. All too frequently the laboratories receive useless, improperly prepared samples with little or no pertinent information accompanying them. This has a negative impact on the usefulness of the laboratory facilities and conversely, proper samples accompanied by adequate information will enhance the value of the laboratories to the country.

TRAINING SCHOOL FOR ANIMAL HEALTH ASSISTANTS

Situated adjacent to the Serum and Vaccine Institute and supplying personnel as laboratory technicians, the school is of interest when one makes a study of the Institute. This school trains secondary level students not only in laboratory technology, but also as Animal Health Assistants, Animal Production Assistants and Meat Inspection Assistants. The study course is of two-year's duration and is given on a trimester basis, mid-November to mid-February, March to June and July to September. Two weeks practical training follow each trimester. The school has adequate laboratory and classroom space, an excellent English language laboratory, fair library and fairly adequate laboratory teaching facilities. The principal of the school stresses his need for more library material, a larger staff of instructors and a few pieces of audio-visual aids.

The principal expressed himself strongly on the subject of not being able to supply graduates with any sort of reference material. This need is felt most strongly on the part of field personnel. He has requested this type of assistance for graduating field staff, unsuccessfully to date. He has also requested library material from the A.I.D. Mission.

The school now has 120 students in this year's graduating class and 120 starting their studies. The classes contain 20 to 25 percent girl students.

The most obvious problem areas are those of (1) shortage of transport, (2) need for more teaching staff, (3) additional training for Somalian staff and (4) minor equipment, reagents and glassware for laboratories and the medical museum.

Any overall assistance program should especially take into consideration the need for additional staff training and make provisions for training at least one staff member annually over the next several years.

On the whole, the school seems to be doing a reasonably satisfactory job of training veterinary assistants.

THE NATIONAL UNIVERSITY

SCHOOL OF VETERINARY MEDICINE AND ANIMAL HUSBANDRY

Since the Veterinary Field Services and the Vaccine Institute will be absorbing large numbers of these graduates, an effort was made to obtain information about the Veterinary Faculty and general teaching situation at the University.

This school, too, is situated near the Vaccine laboratories. The Dean, Dr. Ganni, a Somalian, is very forthright in his discussion of the school and its problems. The School of Veterinary Medicine was started in 1974 with 60 students. It graduated 27 students in 1978 of whom 24 were assigned to the field arm of the Ministry's Veterinary Services.

The faculty consists of 18 Somalian and 20 Italian lecturers, at this time. Italy supplies the lecturers through an arrangement with the European Common Market. Since there is a financial advantage involved, there is an intense competition to obtain these posts. This creates a rather unusual situation in that there is a turn-over of Italian lecturers each semester. It would appear that this frequent staff turnover is conducive to a very noteworthy gap in continuity in classwork.

It should also cause losses of time on the part of the lecturers since it would be necessary to become reoriented to the new teaching situation. It would not appear to be a healthy situation in that interest in the school and its students would be minimal.

Dr. Ganni strongly emphasized his interest in getting away from the traditional European methods of teaching and stresses his desire that the students "learn by doing". The Consultant has held several discussions with young Somalian staff members and was impressed by their sincerity and enthusiasm in their jobs. It would appear that these men were carefully selected for the teaching positions. The target goal for the school is 800 graduates in the next 12 years. The school has some 250 students enrolled at this time.

Considering the importance of the Veterinary School and the Livestock Assistants School in the scheme of development of the Somali Livestock situation, it is recommended that a team of Veterinary Educators should be brought in to make an in-depth study of both institutions with the idea of developing a set of recommendations and long-range plans for them in order that they may better fulfill the future needs of the livestock industry and the government. At this time when larger numbers of students are to be trained, it appears more logical to correct any deficiencies that may exist in training than to attempt to carry out retraining or additional training once the students have graduated. It is also recommended that an additional number of young staff members be sent to the U.S. for additional training. If it is possible to select as many as six or eight recent graduates for training, it would be a practical move to arrange a supplementary training program for the whole group at one time at say, Tuskegee Institute. The training could be designed to fill out the gaps in training of the whole group at one time.

THE SERUM AND VACCINE INSTITUTE

The primary reason for the Consultant's trip to Somalia was to make an in-depth study of the Serum and Vaccine Institute. The study was to include physical plant, personnel, equipment and supplies, and training needs.

In order to carry out this assignment effectively it was necessary that the Consultant spend the greatest amount of time possible at the Institute and being there observing six days a week. It was also necessary to develop a high level of rapport with the staff members and the UNDP/FAO team of experts. The Consultants believes that he secured the confidence of the staff members and that he can, therefore, present a clear and true picture of the situation as it exists.

The Serum and Vaccine Institute as it is called, is actually mis-named. In actuality it is the Central Veterinary Laboratory of Somalia. The Institute was originally located at Merka during the colonial period and was moved to modern facilities in Mogadiscio in 1969. It is now wholly contained in one modern facility supported by an unusually good set of support buildings.

At this time, all functions of the Vaccine production units and the diagnostic unit are carried out under one roof. This is a dangerous situation in that pathogenic materials are not and cannot be properly isolated. This could lead to unnecessary accidental exposure of personnel to hazardous materials as well as possible contamination of vaccine materials.

In an effort to correct this situation, the Government of Somalia is finishing a new diagnostic building, isolated from the vaccine unit. This building, when completed, will be more than adequate for some time to come to fulfill the needs for space both for diagnostic and disease investigation work. Unfortunately, the construction in its final stages has almost reached a standstill. It should be possible

to have the building in useable shape with no difficulty within a period of less than 60 days if the Ministry can stimulate the contractors. Work to be done includes plumbing, final electrical hookup and final painting.

The remaining buildings make up the support group and are in general in good condition and adequate in so far as space is concerned. These include large animal stables, a new experimental animals building, general small buildings now used as small animal colony buildings, a large warehouse with walk-in refrigeration and an adequate workshop.

Physical Plant Recommendations

1. Build separate, minimal office space for the administration. This space could be either separate or an addition onto the Diagnostic Building. Preferably, it would be separated and between the entrance gate and the present laboratory buildings. This would cut out unnecessary traffic in the laboratory areas.
2. Complete the diagnostic unit as rapidly as possible and move diagnosis, serology, pathology, autopsy and parasitology. If necessary, since laboratory benches have not been ordered, temporary locally constructed formica-topped tables can be used until such time as the laboratory furniture arrives.
3. Reallocate space in the Vaccine Production Building. The wing where the Director's office is located should be used for washing, sterilizing, water distillation, media preparation and storage of sterile glassware. The opposite wing would then be arranged into bacterial vaccine production. Experimental mycoplasma vaccine work would be maintained on the floor above. The ground floor bacteriology would have a vaccine bottling unit, a separate anthrax unit, walk-in incubator room and inoculation units.

Officers could be housed temporarily in the diagnostic unit or on the first floor of the vaccine building. It would be preferable in the diagnostic unit.

The top floor would then be reserved exclusively for a completely self-contained viral vaccine production unit.

The present sterile hoods in the lyophilization room should be modified and automatic, syringe type (American style) ampoule fillers installed in the hoods. This area would be used for filling of sterile ampoules for lyophilization.

4. Finish installation of the pass-thru autoclave in the lyophilization room and test.
5. Repaint each suite of rooms as the work is completed.
6. Arrange permanent troughs with covers or make other suitable arrangements for electrical cables now on floor.
7. Remove all unnecessary items from buildings to warehouse or workshop. Remove the Terruzzi lyophilizer to workshop. Suggest that this unit is useless as is and since the factory technicians could not make it operate satisfactorily, the unit should be salvaged for refrigeration units, vacuum unit and controls. There is a very great amount of useful relays, pressure switches, indicators, etc., that could be used on other equipment in the future. At the moment, this monstrous unit is utilizing valuable space that can be put to better use.

8. Have the instrument technician check out and put in order the large autoclave on the ground floor. This unit should be shifted $1\frac{1}{2}$ to 2 meters to the left in order to install the new unit now on order alongside it. One set of water deionization equipment and the air compressor would be enough to serve the two units.
9. Construct poultry unit. Plans have been supplied to and discussed with the government architect. The plans and the layout of the small poultry units should be followed closely. Once poultry are placed in the unit all personnel except the laborer and the responsible supervisor must be forbidden entry. It is absolutely necessary to maintain complete isolation of this unit. The unit should be located near the center of the area to the rear of the present vaccine building and well-isolated.
10. When the small experimental animal colonies are started, the same rules should apply as to (9) above.
11. Construct a building in center of area near main buildings to house new 200 and 300 kva transformers. The building should be built large enough to house the transformers, switch gear, automatic servo voltage regulator and one 300 kva fully automatic diesel generator set. A building 10 x 10 meters should suffice. A large double steel door in one end should be large enough to allow access for installation of equipment.

This is a very important item since the voltage fluctuation at present of about 16 percent is largely due to transmission line resistance on the secondary side supplying 220 volts to the facilities. The present 220 volt transmission lines of several hundred meters are much too long.

Electrical Supply

Electrical supply is from the city of Mogadiscio supplemented by a small, manual start French diesel unit of 100 KW. High tension lines supply power to a bank of transformers in a small building at the entrance gate to the Institute. Voltage reduced to 220 volts is then supplied by transmission lines to the laboratories. These lines are long enough that when a heavy load is connected, a drop of as much as 16 percent is noted. This can be corrected by installing a transformer bank near the buildings and thus lower the line resistance that now exists. Since all equipment is electrically operated, the water stills, autoclaves and the refrigeration equipment produce a very heavy drain when operating.

Equipment

The Institute has an impressive amount of equipment, some of it obsolete and useless, but on the whole it is well equipped. The major piece of useless equipment is the Terruzzi freeze dryer. This piece of equipment occupies an inordinate amount of useful space, is outdated and furthermore, it seems that no one can get it into operational order. It has an excessive number of controls and readouts which make the machine too complex in operation if it could be used. All these unnecessary controls, readouts and extra working parts increase the possibilities of breakdown and complicate any attempt at repair.

The only possibility the Consultant can see to do with this machine would be to salvage all useable parts and keep them in the workshop for future use. Vacuum pumps, gauges, thermocontrols, relays, pressure switches, pumps, and refrigeration units could certainly be found useful in the future if stored securely and properly.

The actual picture of just what equipment is on order is unclear. Largely this seems to be a result of FAO/UNDP procedures. It seems that items that are thought to be on order may be removed from the original order by personnel in Rome without due notification of personnel on the project. Thus a fair amount of uncertainty exists as to just what will be received or when. Long ordering and delivery delays seem to be the usual thing and create an unnecessary amount of pessimism on the part of the technical people involved.

At this time the UNDP technical staff think they have on order the following categories and amounts of equipment and which is subject to unannounced change:

4 Land Rovers	\$60,000
2 Microbuses	20,000
1 Sedan	4,000
1 Large autoclave	25,000
Water distillation equipment	20,000
8 sterile hoods	3,500
Microtitre equipment	3,000
4 deep freezers	6,000
4 5cu. ft. ovens	4,000
6 bacteriological incubators	4,000
Small, non-expendible apparatus	30,000
Sub-Total	<u>\$270,000</u>
Chemicals and other expendibles	30,000
Books, photo supplies, spare parts	<u>15,000</u>
TOTAL	<u>\$315,000</u>

There are several refrigerators that are rusted and somewhat unsightly. As long as they are useable, they should be cleaned up and retouched with white porcelain enamel applied to prevent further rust. Since they are old, plans should be made at a future date for replacement.

The laboratories also have one model 20 Edwards freeze dryer. This is an excellent machine but it requires a highly trained technician to operate it. It is the Consultant's studied opinion that this machine is much too sophisticated and therefore subject to too many faults in its control system. It can now and should be only operated in the manual mode. This machine can cause too many problems if it is attempted to operate it in the automatic mode. This machine utilizes two large refrigeration units and these are charged with Freon 502 which is not easily available and is not commonly used. It should be supplemented by a simple machine such as the Vir Tis machine which is subject to fewer problems and is much simpler to maintain as well as less costly.

Equipment Acquisition Recommendations

1. Purchase of one diesel generator set, approximately 300 KVA, 3-phase 380 volt, 50 Hz. This should be accompanied by a control and switch-gear console, completely automatic. Previous experience has shown the Onan unit to be completely reliable in West Africa. The Onan unit is powered by a Cummins diesel engine and responds within 30 seconds or less to powerline failure.
2. Purchase of one 300 KVA servo-operated voltage regulator. In this instance the General Electric Corporation supplies a transistor sensor/amplifier controlling a servo regulator that does an excellent job of maintaining constant voltage in overcoming incoming power fluctuations. The unit should be equipped with input and output voltmeters in each phase.

3. Purchase of one Phillips Model PLN 106 or Model A liquid nitrogen plant, capacity six liters per hour. This plant should include fractioning column and 4 Linde Dewar containers of 20-40 liters each.
4. Purchase of Milli "Q" reverse osmosis water purification system for production of ultrapure water for cell culture work.
5. Purchase of Belco or equivalent multi-tier roller bottle apparatus for cell culture production. Experience in West Africa indicates an increase of 1 log titre in vaccine potency using this equipment and the fact that the cells are healthier as well as producing an increase in growth. This equipment would be accompanied by an adequate supply of borosilicate glass roller bottles with deep skirt tops and 38 mm openings. They should have about 1,000 sq. cm. growth area.
6. It would be useful to purchase one complete pilot freeze dryer, the Vir Tis freeze mobile made in Gardner, N.Y., to be used for freeze drying small batches of vaccines such as experimental types. The operating parameters and the vacuum sealing on this machine are identical with that of the large production machines and the methods used experimentally are readily translatable to the large machines when it becomes feasible to make large lots of vaccine.
7. Purchase of one Model 100 series Vir Tis mechanical stoppering under vacuum freeze dryer. Three of these machines, one Model 100 and two smaller units have been in use for a number of years in Mali. These machines are practical, relatively trouble-free and simpler to maintain. These machines are caster-mounted, self-contained and do not clutter up the area with odd bits and pieces of equipment scattered around. Unit to include complete set of spare parts.

8. Equipment for Workshop:

- 2 sets of taps and dies, both metric and American
- 2 sets precision metric high speed twist drills 1 mm to 25 mm
- 1 arc welder, single phase 220 V, 300 A.
- 1 supply of arc-welding electrodes, 2 hoods
- 2 large cylinders each of Freon 12, 22 and 502
- 1 9" toolmaker's precision lathe with 4 and 3 jaw chucks, Jacobs chucks and mandrels to fit, taper cutting attachment, 2 sets lathe tools and
- 1 rotary indexing table, precision
- 1 set pipe dies
- 1 pipe vise and stand
- 1 set mechanic's tools
- 1 set refrigeration tools
- 2 sets refrigeration gauges
- 1 G.E. Freon leak detector, a.c. model
- 1 Electronic voltmeter (100 mv - 1000 V), simple apparatus, digital
- 2 Variable transformers from 0 to 280 v, 1½ kw.
- 1 soldering iron, electric 350 W, 220 V.
- 1 Battery Charger (6-12 V, 2-10 A)
- 1 Battery tester and filler
- 1 Revolution counter for centrifuges
- 2 Vacuum leak detectors, high frequency (220 V, 50 Hz)
- 2 Acumet 150 portable pH meters and electrodes
- 1 Vibrograver
- 1 Temperature indicating crayons - 212F, 248F, 356F
- 2 Automatic pipetting machines with syringe adapters and syringes, 0.5 - 5 ml, BBL with extra syringes

- 2 bottles nitrogen
- 1 2-stage regulator with gauges and all necessary fittings for Nitrogen bottles
- 1 Electric multimeter for voltage, current and resistance measurements (simple type)
- 2 Industrial hot plates
- 2 Heavy duty shaking machines
- 2 Portable pressure-vacuum pumps
- 2 Manostat peristaltic pump
- 1 Tubing system Tygon
- 1 Electric bag sealer
- 5 Pairs asbestos gloves
- 2 Colony counters
- 100 Pairs natural rubber gloves - sizes 9 and 10

9. Equipment and other materials for virus vaccine production

RINDERPEST VACCINE - tissue culture attenuated virus

- 1 Roller apparatus, cell production, modular, floor model base only, 5 positions- Belco Catalog No. 7730
- 8 Roller apparatus, cell production, modular, deck only, five positions per deck, Belco Catalog No. 7730-75010
- 4 Roller Drums - Belco Catalog No. 7736-00351
- 200 Bottles, roller, Borosilicate, 38 mm deep-skirt screw cap, Belco Catalog No. 7730-38370 (growth area 950 cm²)
- 20 Roller bottle brushes, Belco Catalog No. 7731-11111
- 5 Roller Bottle scrapers, Belco Catalog No. 7731-22222
- 20 Trypsinizing flasks, capacity 300 ml, Belco Catalog No. 1989-00500
- 20 Trypsinizing flasks, capacity 500 ml, Belco Catalog No. 1989-00750
- 10 Bottles, harvesting, complete, capacity 9 liters, Belco Catalog No. 1971-70009
- 4 Stirrers, magnetic, single position, Belco Catalog No. 7760-06000
- 20 Stirring Bars, magnetic, Teflon molded, length 1 inch, Belco Catalog No. 1975-0010
- 20 Stirring Bars, magnetic, Teflon molded, length 2 inches, Belco Catalog No. 1975-0010
- 2000 Tubes, culture screw cap, 16 x 100 mm, Belco Catalog No. 2012-16100
- 500 Tubes, tissue culture, Leighton type, screw cap, Belco Catalog No. 1908-16150 (16 x 150 mm)
- 5000 Slip covers, 9 x 22 mm, Belco Catalog No. 1916-090222
- 20 Racks, self-locking, for T.C.tubes, Leighton type, Belco Catalog No 1917-00016
- 300 Flasks, tissue culture, T-type, screw cap, Belco Catalog No. 1932-18060,T-60

Needs of solutions, cell culture media and reagents for production of 5,000,000 doses of RPV Vaccine on MDEK cells:

- 60 litres, 12 x 5 liter pkgs, MEM with Hanks BSS
- 150 litres, 30 x 5 liter pkgs, MEM with Earle BSS
- 5 litres, 5 x 5 liter pkgs., Sodium bicarbonate 7.5 percent
- 10 litres, 10 liter pkg., Calf serum, newborn, RPV antibodies free and mycoplasma free
- 4 litres, 40 x 100 ml pkgs., Trypsin-versein mixture
- 2 litres, 200 x 100 ml Trypsin 1:250 (2.5 percent) in HBSS
- 1 litre, 10 x 100 ml pkgs., Cryoprotective medium (H) BME with 15 percent DMSO
- 60 litres, 3 kg 6 kg sucrose, Additive solution for dry-freezing (5 percent LAH and 10 percent Sucrose)
- 25,000 Small bottles for lyophilization with stoppers and aluminium caps, capacity 10 ml.

10. Training School Needs:

Chemicals and Glassware:

- 15 litres Methyl alcohol
- 5 litres Ethyl alcohol
- 13 litres Absolute alcohol
- 4 litres Acetone
- 3 litres Sulphuric acid
- 4 litres Hydrochloric acid
- 3 litres Acetic acid (glacial)
- 3 kilos Potassium Dichromate
- 3 kilos Sulphur
- 5 kilos Nutrient Agar
- 3 kilos Nutrient Broth
- 4 kilos Blood Agar
- 3 kilos D.C. Agar
- 10 boxes Antibiotic sensitivity discs
- 2 Anaerobic jars
- 300 grams Giemsa stain
- 300 grams Methyl Violet
- 300 grams Leishmans
- 500 grams Potassium Iodide
- 500 grams Carbol fuchsin
- 500 grams Malchite green
- 1 complete set Buffer solution
- 2,000 Petri dishes (plastic)
- 10 litres Formalin pure
- 50 litres Commercial Formalin
- 15 pounds Glycerine
- Menthol crystals

Museum Specimen Jars

- 150 Rectangular with lids - 200 x 100 x 50 mm (height x width x depth)

Clear glass, cylindrical with foot and grip stoppers:

Height mm.			Diameter mm.
100	60	x	50
100	100	x	30
100	100	x	50
100	150	x	50
100	200	x	80
100	250	x	100

Clear glass, cylindrical with flat stopper:

100	120	x	80
100	150	x	80

Reagent bottles, clear glass, wide mouth, with glass stoppers:

capacity
cm³

100	60
100	125
100	250
100	500
100	1000

Reagent bottles, clear glass, wide mouth, with plastic screw cap lined with waxed disc:

Capacity cm^3

100	15
100	30
100	60
100	100
100	120
100	170
100	230
100	350
100	1000

Media bottles, wide mouth, clear glass with aluminium caps:

Capacity cm^3

300	27
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2 Label makers, for printing self adhesive plastic tape 9 mm wide.
Tapes 3 m x 9 mm self-adhesive backing and contained in snap-in cartridge (black, blue or green color)

Museum Jars, rectangular, soda glass, thick-walled with ground on cover plate

Height x Length x Diameter cm.:

100	10 x 45 x 3
100	12 x 10 x 5
100	15 x 8 x 5
100	15 x 16 x 10
100	20 x 13 x 13
100	22 x 15 x 12
100	25 x 22 x 10
100	25 x 25 x 14
100	26 x 15 x 8
100	30 x 20 x 18
100	30 x 25 x 6
100	36 x 15 x 10

Glassware for Laboratory:

5 dozen glass beakers (various size)
Measuring cylinders (graduated):
2 dozen 100 cm^3
2 dozen 250 cm^3
2 dozen 500 cm^3
2 dozen 1000 cm^3

Flasks (Pyrex):

3 dozen 250 cm^3
3 dozen 500 cm^3
3 dozen 1000 cm^3
3 dozen 2000 cm^3
3 dozen 5000 cm^3
10 Graduated Centrifuge tubes, 10 ml. (10 dozen)
50 dozen Glass Petri-Dishes

Graduated pipettes:
 5 dozen 1 ml.
 5 dozen 2 ml.
 5 dozen 5 ml.
 5 dozen 10 ml.
 5 dozen 25 ml.

10 dozen Reagent bottles (various sizes)
 5 dozen Dropping bottles (large size)
 Glass tubing for pasteur pipette making
 3000 Microscope slides
 6000 Cover Slides - assorted
 1 Overhead Projector, 3M.

Textbooks:

<u>Title:</u>	<u>Authors:</u>	<u>Publishers:</u>
Diseases of Poultry	H. E. Biester & L. H. Schwarte	The Iowa State University Press Ames, Iowa, U.S.A.
Veterinary Operative Surgery	Ewald Berge	Medical Book Co., Copenhagen
Clinical Veterinary Surgery	A. C. Shuttleworth	
Textbook of Meat Inspection	Horace Thornton	Bailliere, Tindall & Co. London
Food Processing Operations, Vol. 3	Maynard A. Jolyn	The American Vet. Inst. Pub- lishing Co., Inc., Westport, Conn., U.S.A.
The Dairy Farmer's Veterinary Book	Norman Barron	Farming Press (Books)
The Practice of Veterinary Medicine	D. H. Udall	Published by the Author, Ithaca, N.Y., U.S.A.
The Artificial Insemination of Farm Animals	Enos J. Perry	Rutgers Univ. Press, New Brunswick, N.J., U.S.A
Physiology of Reproduction and Artificial Insemination of Cattle	G. W. Salisbury	W. H. Freeman & Co.
Practical Animal Husbandry	William C. Miller	Oliver & Boyd, Edinburgh
Approved Practices in Feed and Feeding	Daniel W. Cassard	The Interstate Printers & Publishers, Inc. 19-27 Jackson, Danville, IL., US
Animal Nutrition and Veteri- nary Dietetics	John T. Abrams	W. Green & Sons, Ltd. Edinburgh
Meat Handling in Under- developed Countries	I. Mann	F.A.O. No. 70
Meat Hygiene	The Joint Committee FAO and WHO	FAO Agric. Studies No. 58

Milk Sterilization	H. Burton, J. Pien & G. Thieulin	FAO Agric. Studies, No. 65
Clean Milk	Harry Hill	H. K. Lews & Co., LTD. London
Animal Diseases and Human Health	James H. Steele	FAO No. 3
Biological Science	William T. Keeton	E. E. Norton & Co., Inc. New York, USA
Zoological Technique	T. L. Green	Allman & Sons, LTD. Greenchurch Lane, E.C.3, London
General Botany Laboratory Book	Edward M. Palmquist & Larence C. Petry	W. B. Saunders & Co. Philadelphia, Pa., USA
Concepts of General Chemistry	C. R. McLelin and Marion Day	F. A. Davis Co. Philadelphia, Pa., USA
General Parasitology	V. A. Dogiel	Oliver & Boyd, Edinburgh
Textbook of Veterinary Clinical Parasitology, Vol.1	E.J.L. Scalsby	Blackwell Scientific Pub- lication, Oxford
An Introduction of Veteri- nary Pharmacology	Frank Alexander	E. & S. Livingstone, Ltd. Edinburgh
A Handbook of Animal Physiology	E. M. Pantelours	Bailliere, Tindal & Cox, 7 & 8 Henrietta St., Covent Garden, London
Laboratory Exercises in Animal Physiology	Henry W. Schoenborn	W. M. C. Brown Co., Inc. Dubuque, Iowa, USA
The Anatomy of the Domestic Animals	Septimus Sisson	W. B. Saunders Co. Philadelphs, Pa., USA
Practical Microscopy	C. L. Duddington	Sir Isaac Pitman & Sons, London
Medical Microniology	C. G. A. Thomas	Bailliere, Tindall & Cassell London
Educational Charts on Animal Husbandry including Artificial Insemination		
Educational Charts on Veterinary Parasitology		
Educational Charts on Veterinary Anatomy		
Merck Veterinary Manual		

11. Bacteriology List:

- 5 Interval Timers
- 4 4.5 cu. ft. Incubators
- 4 Pipette washers and dryers
- 5 Kilos glass beads - 3 mm
- 10 Cornwall pipettors, cap. 5 ml., and spare cylinders
- 1000 Packages Handi Swab (swabs)
- 5 Anaerobic Jars BBL
- 500 CO₂ Disposable envelopes
- 50 Brushes for Cleaning tubes
- 50 Brushes for cleaning bottles 1500 cc.
- 50 Brushes for cleaning Erlenmayer flasks, 210 cc.
- 5 Marker metal (marker pens) diamond
- 2 Cylinder supports
- 1 Distilled water apparatus, cap. 40 lphr.
- 3000 INOU-CAPS for bacteriological tubes
- 100 boxes Disposable polyethylene gloves (universal size)
- 5000 Test tubes, lipless
- 1000 Plastic syring, capacity 2 ml.
- 1000 Plastic syring, capacity 5 ml.
- 100 Needles, L $\frac{1}{2}$ ", 19, 22, 26 ga.
- 100 Needles, L 1", 19, 22, 26 ga.
- 100 Needles, L $1\frac{1}{2}$ ", 19, 22, 26 ga.
- 100 Needles, L 2", 19, 22, 26 ga.
- 100 Test tube baskets 5 x 4 x 4"
- 100 Test tube baskets, 10 x 6 x 6"
- 50 Petri dishes sterilizing boxes

WAREHOUSING AND INVENTORY

The warehouse situation is much more orderly than many the Consultant has seen in the past. The Consultant prepared a simple card system model for the storekeeper in charge and explained its use. The storekeeper accepted the idea enthusiastically and stated that he would immediately put it into effect.

In essence, the system consists of a master list of all items in the warehouse, each assigned a number. Each card contains this number, a description of the item, source and price of the item and columns for dates of withdrawal, amount withdrawn, stock on hand, balance on hand and a reorder level number indicating when it is necessary to reorder the item. The reorder level should take into consideration the rapidity of turnover of stock, length of delay in delivery and allow sufficient stock remaining in the stores to prevent critical shortages in case of delays. It is recommended that a two-year stock be kept on hand and replenished annually.

Each section chief of the laboratories should be required to make a realistic appraisal of the needs of his section on an annual basis. With the recommended card index system, he can be informed immediately of the stock situation in each case and plan accordingly. With this system it will be much easier to forecast future needs and to avoid overstocking of little used items.

One of the smaller buildings near the warehouse should be converted and equipped for storage of excess glassware and plastic ware. The large warehouse would then be used for storage of chemicals, media and items of equipment and glassware having more frequent demand. It is not necessary to store large amounts of glassware in the main storeroom.

PERSONNEL AND THE WORK PICTURE

The staffing pattern of the Institute is as follows:

Somali Veterinarians	5
Somali Lab. Technicians	25
Laboratory helpers	11
Animal attendants	14
Cleaners	4
Drivers	<u>5</u>
TOTAL	64

UNDP/FAO

Czechoslovak Veterinarians:	
Bacteriologist	1
Virologist	1
Parasitologist	1
Pathologist	1
Team Leader	<u>1</u>
TOTAL	5

Czechoslovak Technicians:	
Lab. Technician	1
Instrument Technician	<u>1</u>
TOTAL	2

An extremely easy, informal atmosphere exists in the Institute. Its informality leads one to observe that perhaps the relationships are a bit too democratic. This informality is disruptive of the work and to a large measure indicative of a lack of discipline. A Vaccine and Disease Investigation Laboratory should be, by its very nature, a place in which serious work is performed. It is true to some extent that the workload is not constant and thus it does create some idle time. However, there is enough to be done and enough to be learned to keep the staff busy at all times. Properly scheduled work plans, well-supervised and enforced will solve this problem.

It is very noticeable that any staff member from cleaners and chauffeurs to scientific staff may break in on the Director regardless of whether he is in conference or not and interrupt whatever he is trying to do. The Director exhibits an amazing amount of patience and equilibrium in the face of this situation.

The Director of the Institute is a veterinary graduate of Zagreb University with 1½ years post-graduate training in virology. His deputy is a graduate of Belgrade University with 1 year post-graduate training in bacteriology at West Berlin. The Consultant is convinced that these two men are outstanding in their potential of achievement given proper on-the-job assistance and future U.S. advanced training.

On the whole, the Somali staff is impressive in its learning potential and its potential value to the country. The biggest single problem is that the staff is underemployed and in need of an established work discipline.

In order to make a laboratory setup such as this operate smoothly, it is necessary to establish carefully thought-out, detailed work plans for each section, assign responsibilities to key personnel, maintain thorough supervision and, finally, require that the personnel accept and carry out the responsibilities assigned them.

It could be possible then for the government, once proper administrative organization exists, to establish some sort of incentive pay program or a series of prizes to be awarded the most outstanding personnel of a given period of time. This would give the personnel something to strive for and would be based on such things as work performance, job attendance regularity, interest in self-improvement, initiative and industriousness. This type of program could well be given a trial in order to assess its value in this situation.

The Consultant suggests that the Director establish a fixed hour of each day for staff conferences and eliminate the constant disruption of his time by staff trivia, thus allowing him to utilize his time more effectively for things of major consequence.

The Consultant has written, at Mission request, an Accelerated Impact Project and has submitted it for approval. This A.I.P. which is attached as an Annex to this report sets forth what he believes to be a logical means of assisting the correction of problems seen at the Institute. The Consultant is convinced that the implementation of the A.I.P. is of the highest priority, and is the foundation on which any future assistance must be built. The A.I.P. is basically aimed at an on-the-job training program directly affecting all technical personnel of the Institute.

As is mentioned in the A.I.P., the Consultant is impressed also by the capability and potential of the UNDP/FAO team and what it can accomplish here. The breadth of experience necessary and organizational background necessary to real success are missing.

There is no question in the Consultant's mind but that both the UNDP/FAO team and the Somalis would cooperate wholeheartedly with personnel of the proposed A.I.P. and that their working together would be harmonious.

ORGANIZATION AND MANAGEMENT

Organization and management deficiencies could very well be the root cause of much of the somewhat chaotic conditions seen at the Institute. It is a well-recognized fact that both professional and scientific educational systems are sadly lacking in these fields.

Organization of the laboratories is a not too difficult task. First one must break down the major activities that the laboratory is expected to carry out into their respective components. Determinations are then made as to what personnel are to be assigned to which functions. A detailed job description is then prepared for each person and that person is instructed in carrying out his or her duties as described.

This would apply to all personnel in the Institution. Then it becomes the most important matter of establishing and maintaining thorough supervision. A monthly report on the effectivity of all personnel would then be submitted to the Director for his information. The Acting Director General has stated that "personnel who are not capable of doing a good job must be removed". Such being the case and with monthly section chief's reports for support, the Director can make effective personnel recommendations to the Director General.

This basic plan of organization should rapidly produce the desired results of order and discipline in the Institute.

A further point to be made in the organization and management is the importance of having the best personnel in the operation. Some means of compensation should be made that would make it unnecessary to transfer the best people to other jobs for promotion. Given the importance of the Institute and the importance of its best personnel to the continuity needed in achieving the goals set, it is virtually necessary to maintain the best personnel in key positions. Keeping the best personnel available at the Institute should not in turn be a penalty to their future.

TRAINING AND GUIDANCE PROGRAMS

The Consultant places first priority on an on-the-job training and guidance program which is the *raison d'etre* of the A.I.P. The training and guidance program would be carried out on several levels in the various disciplines so necessary to the proper functioning of the Institute. Qualified persons would be brought in to train staff members in order to fill out any deficiencies in modern techniques and methods in bacteriology, virology, diagnostic procedures, disease investigation and reporting, disease identification and organization and management of laboratories. The program designed in the A.I.P. is a high quality program that the Consultant feels can best be implemented by the USDA's Animal and Plant Health Inspection Service as set forth in the A.I.P.

These on-the-job training programs would be designed for the technical levels of the staff addressed.

Future off-shore training in the U.S.A. would be made available to selected staff members always keeping in mind that no gaps in the field of work should be allowed to interfere with the Institute's goals. This should be taken care of through adding newly graduated, selected veterinary personnel to the staff in order to develop personnel depth at the higher technical levels.

THE FUTURE OF THE INSTITUTE

With an animal population that exceeds 30,000,000 and may reach 40,000,000 animals of economic importance, Somalia has great need for and places very high priority on an effective Institute which would be the foundation upon which is built the protection of the animal population. Over the past three years the Institute has produced an average of 1.7 million doses of vaccine and last year carried out some 27,000 laboratory diagnostic procedures. With increases each year in the field delivery staff and with increased assistance from the central government, one would expect a ten-fold increase in vaccine of much superior quality to be produced within the next year or year and a half. A great increase in sample processing would be expected at the same time.

It would be logical to assume that A.I.D. would be in a position to expand its assistance to the Institute based on foundations laid by the A.I.P. team, performance by the Somalians themselves and a thorough in-depth study of the most urgent needs of the country.

The Consultant agrees wholeheartedly with the Director's ambition to make his Institute one of the best in Africa. This can be achieved through the solutions of the problems presented, additional budget assistance on the part of the

government in keeping with its ability to assist, assistance on the part of A.I.I in the form of the A.I.P. team and possible future A.I.D. assistance to be determined at the end of the A.I.F. period.

It is very well to plan for the future in terms of expanded operations such as the proposed manufacture of human and animal rabies vaccines, anti-tetanus sera and toxoids, but first the basic problems that now exist must be corrected and the institute put in smooth running order. The hard reality of the matter is that if everyone works hard at it and full cooperation is assured, it may take as much as two years to achieve the smoothness of operation desired. By then, the institute should be in good shape to accept additional responsibilities and the burden of further increases in demands for both vaccines and services. By that time the increased demands expected can be taken in stride without disruption.

In looking ahead at the future activities that need attention, one must first break down the animal population into the numbers of different species in order to develop a picture of the relative importance of each. The thirty plus millions of domestic animals of economic importance consist of over five million goats, an equal number of camels, nearly twenty million sheep and nearly four million cattle. The cattle population is and has been receiving the greatest attention and only recently have efforts been made toward solving problems of the remaining species.

It is very important that an expanded effort be made to first study the incidence and economic losses caused by the major diseases of sheep, goats and camels. This in turn must be followed by development of applicable control methods that can be applied in an economically feasible manner. Diseases such as contagious caprine pleuropneumonia, sheep pox and camel pox come readily to mind as needing solution. It is possible that camel pox is causing much more severe losses than first thought.

While studies have been carried out and are being continued on the diseases of sheep and goats throughout the world, little has been done to date in the camel disease situation. It would appear logical to start a serious program of investigation leading to eventual control of diseases in this species. The importance of these animals to the country's economy both externally and internally would easily justify such a program and the results obtained could easily be applied in other countries of Africa where the camel is also important.

COMMENTS ON THE UNDP/FAO TEAM

On the whole, the Consultant is impressed by the capabilities and potential of the team. The team consists of a virologist, pathologist, bacteriologist, parasitologist, laboratory instrument technician and laboratory technologist--headed by a project leader. No discussions have been held to date with the project leader who seems to be busy in UNDP paperwork matters. Discussions have been frequently held with the remaining team members and the two Czech contract field veterinary diagnosticians stationed at the Institute. These men appear intensely interested in the job to be done and with a little encouragement and direction would be able to accomplish much more. They are open to suggestions and actively seek new opinions and ideas.

The Consultant is particularly impressed by the work of the instrument technician. This man is sound and doing an outstanding job of rehabilitating equipment and putting it into useful condition. The Consultant recommends that he be given overall responsibility for maintenance and repair of all equipment. The

man, however, does need additional pieces of equipment for his workshop and any reasonable requests for equipment and supplies should be given highest consideration.

CONCLUSIONS

The Consultant is, on the whole, favorable impressed with the Institute and its personnel. If there were no problems, the Consultant would not have been asked to come in the first place. The Consultant sympathizes with the Director's impatience and desires to both improve his Institute and to make progress faster. One is convinced of his sincerity. The Consultant is convinced that progress is going to be made more slowly than the Director desires, however, but feels that the slower progress will become a much sounder foundation for the Institute's future. It is to be hoped that the A.I.P. will be approved and that it in turn will help develop a coming broader project of assured success for the future of both the Institute and the livestock industry.

The Consultant wishes to express his keenest appreciation to all Somali government officials concerned for their courtesies, friendliness and frankness demonstrated on all occasions and sincerely hopes that this report will be of value.

ANNEX

ACCELERATED IMPACT PROJECT

SERUM AND VACCINE INSTITUTE, MOGADISCIO, SOMALIA

DESCRIPTION OF THE PROJECT

The Serum and Vaccine Institute (Central Veterinary Laboratory) at Mogadiscio was moved to Mogadiscio in 1969 from Merka, site of the original colonial institution. It is now wholly contained in one modern building for laboratories supported by usual laboratory service buildings.

At the present time the laboratory operation is in a transitional and reorganizational stage of development. Completion of a new diagnostic building is near and should be ready for occupancy soon. At that time all diagnostic work and pathogenic materials will be moved from the present facility, thereby lessening dangers of vaccine contamination possibilities as well as those of accidental exposures of personnel. The Institute serves as the sole central source for animal vaccines and anti-sera. It further carries out nationwide diagnostic services, field investigation services and performs limited research, particularly in vaccine improvement. The laboratories performed last year some 27,500 laboratory diagnostic procedures in 1977.

In 1978, 1,796,162 doses of vaccine were produced as follows:

1. Anthrax Spore Vaccine	0	(a)
2. Blackleg Vaccine	12,604	
3. Pasturella Vaccine	165,000	
4. Bovine Paratyphoid	183	
5. Bovine pleuropneumonia	537,500	
6. Caprine pleuropneumonia	0	(b)
7. Enterotoxemia of sheep	60,875	
8. Rinderpest	1,000,000	
9. Sheep pox	under preparation	
10. New Castle disease	0	(c)
11. Fowl pox	0	(c)

(a) and (b) will be reinstated this year. Shortage of supplies due to unforeseeable causes stopped production. 512,250 doses produced in 1977 of Anthrax, 200,000 CCPP.

(c) Unsuitable embryos caused stoppage of production. Will reinstate in 1979 with laboratory source.

It is expected that a great increase in production will be shown in 1979.

The delivery system, under the management of the Director of Animal Health, consists of 16 Regional Veterinary Centers, four run by veterinarians, the remainder run by veterinary assistants. There are 233 veterinary assistants in the country. The laboratories supply vaccines to the field services division of the Animal Health Services which in turn applies it in the villages, regional centers and to the nomadic herds where possible. In turn, requests for diagnostic assistance and disease investigations filter up through the field services to the laboratories for action. Vaccine production and application is reaching only a small percentage of the animals, only the more accessible ones and on a basis of containment of disease rather than as it must be in the future, a prophylactic

measure reaching at least 50 percent of the accessible animals, those of higher value and thereby acting as disease control barriers. This alone would and will require a massive increase of vaccine production of an exponential nature which can be easily attained through newer production techniques and organizational methods. The government is increasing its emphasis on enlarging the field services through using new graduates and assigning more veterinary assistants to the service as they become available. The University Veterinary College plans to turn out veterinary graduates at a rate that will produce a total for all the services of 800 in the next 10 to 12 years.

There are several critical situations which are rapidly contributing to future problem areas for the institution and which must be faced immediately. The most obvious fact of all is that the GSDR government is seeking and obtaining aid from a wide variety of donor countries in an effort to improve and accelerate progress across the board in livestock and poultry production. There are two very large rangelands projects involving ruminant animals and at the moment a greatly expanded integrated poultry operation. There is a logical sequel to this expansion in that the demands placed on the Serum and Vaccine Institute are expected to vastly increase both in amounts of vaccine needed in the coming two years and in the quality of services performed. These bi-lateral and multi-lateral projects will be staffed by foreign and national technical staffs who will intensify the demands made both through direct requirements and as they proceed in extension activities create increased general public requirements. The very large Central Rangelands Project of the World Bank is an excellent example. In the animal disease field it will import three foreign field veterinarians and will have assigned a large staff of local veterinarians as well as animal health technicians. These technical people will in turn generate a greatly increased demand on the laboratory and its staff for services and vaccines.

The staffing of the Institute consists at this time of six Somali veterinarians, 25 laboratory technicians and 34 laborers. It is supplemented by five FAO veterinarians and two FAO technicians. The present staff situation both in local and expatriate staff demonstrates willingness to work and great potential, but excessive gaps exist in the matter of experience on the part of all individuals. Administrative organization is weak as exhibited by the fact that the Institute's Director spends a major part of his available time on minutiae and little time in his field of virology.

The staffing situation and the organization pattern exhibited are problem areas that contribute greatly to the overall mass problem previously mentioned.

The ability of the laboratory to meet future demands which are rapidly materializing and to make a positive contribution to the success and well-being of both the livestock and poultry industries and the related large internationally-financed projects will depend on improving the training and competency of the Somali staff.

At the same time it will be necessary to initiate a carefully-planned field staff training and up-grading program. This program will fit in very well as an ancillary training program to that already mentioned. This program would include, periodically, additional training for field veterinary, veterinary assistants and vaccination teams.

Along with this and of great importance is the need of a rational laboratory administrative organization designed to eliminate the greater amount of the present somewhat chaotic conditions and thereby eliminate excessive demands on the Director, thus allowing him to use his talents more effectively. Guidance is greatly needed

in the up-coming space reorganization, the effective utilization of personnel and equipment, the establishment of a proper long-term work plan, vaccine evaluation and testing, equipment disposition, establishment and maintenance of experimental animal colonies and improvements in techniques and methods in vaccine production and diagnosis and investigation of diseases.

Strong guidance is needed in future equipment procurement in order to avoid acquisition of equipment of questionable value or purchasing of equipment of such complex nature that it can never be effectively utilized. An example of this is the Italian freeze dryer purchased by ASDR and which the factory technicians were unable to put in proper operating condition, a very costly situation. With proper guidance this would not have happened. This is only one of a number of honest but avoidable errors. With a reasonable amount of experienced guidance and training the operation can become, in a short time of 12-24 months, a smoothly operating organization meeting the basic needs of the sectors of agriculture reliant on it.

With an animal population of nearly 40,000,000 animals contributing to the national economy and it is estimated as being owned by more than 2 million people, the dangers of the situation are glaring when one considers the application of an average of 1.7 million doses of vaccine at most have been carried out annually over the past three years. The previously 90 percent vaccinated cattle population is rapidly producing new generations of rinderpest-susceptible calves, increases of exposures to bovine pleuropneumonia are taking place and anthrax is a constant threat. These are only three of the major disease problems that if vaccinations continue to lag, contribute to an explosive situation.

This proposal consists, then, of a necessary on-the-job training and guidance program comprised on one senior veterinarian experienced in laboratory organization, management and vaccine production and the necessary short term assignment of consultants to meet specific needs of the various sections of the vaccine and diagnostic facilities and with minimal commodity support.

In summary, a problem exists in that one of the keys needed to ensure the success of the Government of Somalia's very great stress on improving its major resource, that of the livestock industry, is coping with rapid and accurate diagnosis of disease problems and prevention of animal diseases. A most important part of that problem must be met by the Serum and Vaccine Institute through its supply of vaccine and diagnostic services which it will be unable to do satisfactorily unless previously described actions are taken in on-the-job training and guidance.

No other viable alternative of assuring the necessary immediate results exists at this time. One important factor is that this particular action allows a continuity of program to take place in the matter of services and production of vaccines at an ever-increasing level with least possible disruption. A more appropriate timing of offshore advance training for key personnel can be worked out at a later date. Another important factor is the urgency of need for results.

Justification for American assistance is based on the application and training in American know-how in this field. It is amply supported by the results being achieved and already achieved by the APHS group in other countries. Furthermore, the stress being placed by the Government of Somalia of both the importance of this activity and of American participation in it is very strong. The frankness exhibited by all concerned regarding their limitations at this time and the stress of the need of American guidance is very impressive.

Since the outputs of this project are such that they directly have a bearing on the well-being and productivity of the large revenue producing domestic animal population, it is obvious that they benefit the livestock people throughout the country. Any improvement in methodology, quality and availability of products and services benefits this important human and animal sector.

RELATIONSHIP TO THE DAP AND THE HOST COUNTRY PRIORITIES

No conflict exists between the project and the DAP. The project is an integral part, and a vital one, of the improvement of the local livestock industry. Moreover it is basic just in the maintenance of the industry alone. Any improvement of the industry will in itself make increased demands on the productive capacity of the institute in both materials and services extended. This project will affect in a positive manner both the quantitative and qualitative productivity of the institute.

The concerned ministerial arm of the government of Somalia is thoroughly cognizent of the importance of the role the institute plays and is strongly supportive of it, to the extent possible. Top ministerial officials are strongly supportive of the ideas submitted in this document.

Priorities of this project in the development of Somalia's livestock industry are at the very top. Development of the industry is a very high Somali Government priority. The A.I.D. program places very high priority on development of the industry and per se this activity.

The overall priorities are further emphasized by the contribution the industry makes to both human nutrition and the export revenue to the Somali Government. A final consideration is the time-frame presented in this document. Given the necessary priority indicated, the project can make a much needed impact on the Institute and through it benefit materially the industry in the matter of a short period of less than two years.

POLICY ISSUES

This project faces no major constraints. It will produce no foreseeable problems and is so strongly desired by the Government of Somalia that it should easily fulfill its objectives in a very satisfactory manner. Rather than face technical or trained manpower constraints it will help alleviate the situation through guidance and training. Again, the project is designed to assist in solving and alleviating any administrative problems that exist at the institution's level.

FINANCIAL CONSIDERATIONS

UNDP/FAO Proposed Level of Support (subject to revision)

1979, 1980, 1981

Subcontract (personnel) Czechoslovakia:

5 veterinarians, 1 technologist, 1 technician for three years each	\$1,293,500
UNDP Project support costs - 3 years, Total	50,000
Participant costs - 3 years	48,000
Commodities - 3 years	320,000

Government of Somalia's Contribution in Somali Shillings

Salaries of all laboratory personnel and laborers (salaries amounts undisclosed), Total amount 1200 man months per year

Equipment - over three-year period	600,000
Miscellaneous costs - over three-year period	850,000
Somalia Government Budget Contribution (fixed) - over three-year period	<u>1,500,000</u>
Somalia Government Costs, Total for three year period	2,950,000

U.S. Proposed Costs over Two-Year Period

One counterpart for the director, 24 man months including support costs

Supply of short-term technical services in the fields of laboratory diagnosis, vaccine production, virology, bacteriology (mycoplasmaology), equipment maintenance and repair. Periods, specialities and timing to be determined by (a) above, 36 man months

Commodity support such as minor but essential laboratory apparatus, reagents and chemicals, biological materials, culture media, glassware and transport, 24 month period.

1977 GSDA BUDGET

At a joint meeting on 31 December 1976, the SRSF Politburo and the Council of Ministers approved the country's Budget for 1977 totalling SSh 1,257.8m. The Finance Minister, Mr. Abdurahman Nur Hersi, said that this represented an increase of SSh 166m over last year. He stated that the central government budget was estimated at SSh 1,058.9 (SSh 177.5m more than the previous year). The budget for local government was estimated at SSh 102.4m (an increase of SSh 9.9m). The Minister added that c. SSh 360m would be spent on new development projects. Referring to 1974-8 five-year development plan, the finance minister said that of the SSh 869m earmarked for the plan, c.SSh 699m had so far been spent, with emphasis on education, agriculture, health, livestock development, fisheries and water.

ANNUAL INVESTMENT - 1976 (in thousand Somali shillings)

1. Development Plan	Annual	%
Livestock	38,084	4.7
Agriculture	151,034	19.0
Forestry	4,942	0.6
Fisheries	12,373	1.5
Industry	153,895	19.0
Electricity	57,542	7.0
Water Resources	15,000	1.8
Mining	7,283	0.9
Transport	219,727	27.0
Housing	34,919	4.0
Education	75,173	9.2
Health	7,584	0.9

TRAINING SCHOOL FOR ANIMAL HEALTH ASSISTANTS

Training School for Animal Health Assistants was established in 1967 as a UNDP Project and the assistance from UNDP terminated in June 1976. From July 1976 to June 1977 this project continued as FAO Trust Fund Project with financial assistance from Misereor. From July 1977 it is continuing with financial assistance from Norway. The achievement of this school is given in the following table.

Summary of courses completed and number of students trained

	1969	1970	1971	1972	1973	1974	1975	1976	1977	Total
<u>Regular Courses</u>										
Animal Health Assistants (2 year course)	24	20	20	14	23	-	48	27	31	207
Animal Production Assts. (2 years course)	-	--	--	-	-	-	47	29	19	95
Meat Inspection Assts. (2 years course)	-	-	--	-	-	-	20	18	20	58
Laboratory Technicians (2 years course)	-	-	-	-	-	-	22	15	15	52
Range Management Assts. (2 years course)	-	-	-	-	-	-	13	-	-	13
Sub-Total	24	20	20	14	23	-	150	89	85	425
<u>Ad Hoc Courses</u>										
Junior Laboratory Technician (one year course)	-	-	-	-	11	-	--	-	-	11
Junior Range Management Assts. (one year course)	-	-	-	-	73	-	-	-	-	73
Junior Hides & Skins Assts. (one year course)	-	-	-	47	-	-	-	-	-	47
In-Service Training Course (4 months)	-	-	27	39	39	-	2	-	-	107
Training in Poultry (Practical) Keeping (4 months)	-	-	--	-	--	-	34	-	-	34
Training in lay man in Poultry and Animal Health (4 months)	-	-	-	-	-	130	-	-	-	130
Milk & Fish Inspection Course (4 months)	-	-	-	-	-	-	-	-	6	6
Sub-Total	-	-	27	36	123	130	36	-	6	408
GRAND TOTAL	24	20	47	100	146	130	186	89	91	748

A livestock farm consisting of dairy cattle unit and Poultry Unit were added to the Project in the second phase in 1973-74.