

Evaluates project to promote poultry production in West Africa. Special evaluation covers the period 1971-5/80 and is based on document review and site visits by an outside reviewer.

The Government of Mali's (GOM) Centre Avicole Sotuba (CAS) is an unsound operation--disease and morbidity losses are high (64%); egg production is low (18% or 66 eggs per bird per year); financial records are inadequate; facilities are overstaffed; products are sold below cost; and despite substantial GOM subsidies, the operation is losing large sums of money.

Given this sad state of affairs, the evaluator recommends that the GOM sell the CAS to a private foreign or domestic investor for a sum based on CAS's future profitability or A.I.D.'s past contribution. Less preferred remedies include arranging a lease/purchase agreement or lease/rent agreement with a private investor, turning the CAS into a commercial egg production operation while continuing to produce feed, training the poultry and business management staff to upgrade the present operation, or closing down the CAS.

If the GOM decides to retain ownership, the evaluator recommends that the CAS: (1) locate or train a poultry pathology staff; (2) improve the quality and nutritional value of feed, especially for parent stock and chicks; (3) buy spare parts for the disabled (three of five) incubators and a generator to power all the incubators; (4) debeak day-old chicks and segregate chicks by age to reduce morbidity and mortality; (5) increase the number and cleanliness of waterers to lessen health hazards; (6) have the Central Veterinary Laboratory conduct autopsies bimonthly in order to devise a disease and parasite control program; (7) import fewer parent stock; (8) reduce staff from 97 to 43 and locate a business-minded director and a deputy director with poultry management experience; (9) set up a thorough cost-accounting system; (10) produce high-quality, appealing eggs for public sale; (11) charge farmers for all services performed; and (12) require regional centers to buy chicks and feed wholesale and sell their products for a profit. Finally, it is recommended that the GOM deny the CAS's request for an additional 800,000,000 MF investment.

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**A. L. Nellum and Associates**

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REGIONAL WEST AFRICAN  
POULTRY PROJECT

- AN ASSESSMENT -

April - May 1980

Submitted to

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Subject: REPORT ON CENTRE AVICOLE SOTUBA/MALI

To: U.S. AID MISSION/MALI

From: Dr. George F. Godfrey, Consultant, as contracted by AID through  
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Date: May 5, 1980

#### EVALUATION OF OPERATIONS

This is a poorly run operation both from the standpoint of business operations and poultry management. Egg production is low (18% on a per hen-housed basis for a year), disease and morbidity losses are too high (64%), there are too many people on the payroll, they are selling chicks, feed, eggs and meat birds below costs and market prices, there is an inability to calculate costs and there is a disappearance of products because of improper controls.

Based on my evaluation, CAS is losing at least 58,500,000 MF per year despite a GRM grant of 20,000,000 MF per year and GRM paying 39,381,000 MF of the payroll costs. The total loss is impossible to calculate because of the lack of clear records, but it might be as high as 176,250,000 MF per year. See pages 11-15 for details.

With proper poultry and business management, a 56% reduction in labor force, and attaining reasonable performance parameters of 15% rearing mortality, 25% laying house mortality, 50% egg production of which 80% are hatching eggs for a full year, and 65% hatchability, it should be possible to make a profit of 19,019,472 MF per year. See pages 20-21 for details.

#### ALTERNATIVE COURSES OF ACTION AND RECOMMENDATIONS

The following recommendations are made with my preference in the order given:

1. Sell it to private investors, native or foreign, for about ten times potential earnings (profit), or about 300,000,000 MF.
2. Arrange a lease-purchase agreement with private investors.
3. Lease/rent the facilities to private investors.
4. Turn it into a commercial egg production farm and keep the feed manufacturing operation.
5. Improve poultry and business management by training personnel in present operation.
6. Close it down.

#### DISCUSSION OF RECOMMENDATIONS

Recommendation No. 1: The main advantage of selling the operation is that it cuts further losses. If properly run by a private investor, it should stimulate the Mali poultry industry.

The sale price can be set in one or two ways. The first would be to sell at ten times the profit potential of an operation using reasonable production parameters and labor reductions (See pages 18-21). The sale price for an egg operation would be 315,821,040 MF, and for a parent stock-hatchery operation, 190,194,720 MF. The second way to estimate a sale price is to start with total AID costs of 365,500,000 MF, and with seven years depreciation at 5% per year over twenty years, the present value of CAS is 237,575,000 MF. The sale price range for negotiation is from 190,194,720 MF to 315, 821,040 MF.

Recommendation No. 2: The advantage of the lease-purchase recommendation is the same as above except that the investor has a longer payout period and GRM gets out of a poor operation.

Recommendation No. 3: Under a lease/rent agreement, GRM still owns the

facilities, but only has to account for the rent. This arrangement is desirable if GRM wants to keep the facilities.

Recommendation No. 4: This option stops the hatchery operation even if operated with the 56% recommended reduction in labor force and with reasonable production parameters, it is not as profitable as a commercial egg operation. To continue the hatchery operation would require additional investment in a generator, air conditioner and incubator parts estimated to cost at least 30 to 35,000,000 MF. No additional investment would be required for a commercial egg operation.

Closing the hatchery operation would mean that CAS would no longer supply chicks to farmers. Chicks would have to be imported or bought locally from people with small incubators or broody (setting) hens.

An analysis of a commercial egg production operation, a parent stock-hatchery operation and a broiler operation using the present labor force and attainable production parameters show a yearly profit of 14,266,536 MF for the egg operation, 1,703,904 MF for the parent stock-hatchery operation and a loss of 195,603,940 MF for the broiler operation. See pages 18-22 for details.

The preceding profit potential figures are based on attainable production parameters of 15% rearing and 25% laying house mortality, 50% egg production and 65% hatchability. Using CAS actual performance figures for 1979 for the same traits which were 23%, 64%, 18% and 53% respectively, the loss was about 29,000,000 MF.

The feed operation would be kept because if properly run, it should prove more economical than importing feed. Cost estimates were not made because of lack of appropriate data.

Recommendation No. 5: Considering the length of time CAS has been in operation and the training personnel has had to date, it is questionable if further training would result in CAS making a profit. Training takes a long time and would probably require the cooperation of external donors (unlikely given CAS's past performance record). With the constraints GRM has on the numbers of people hired, even with better trained people, CAS would be overstaffed and would continue to lose money.

Recommendation No. 6: Closing CAS down would cut GRM losses from the operation. GRM would still own the facilities which would deteriorate in time without maintenance.

#### ANALYSIS OF DISEASE

Losses from disease - deaths and morbidity (culls) - are the number one problem of CAS and the Mali poultry industry. Losses from disease were 64% for CAS 1979 housed birds. CAS losses of 1979 percent stock was 39%. Four commercial farmers visited said that disease was their number one problem. See details on pages 7 & 8.

It is recommended that CVL be responsible for poultry disease control. If no qualified poultry pathology staff is available, one should be trained. Details of suggested training programs are on pages 26 & 27.

DETAILED REPORT ON CENTRE AVICOLE SOTUBA (CAS)

Personnel visited: Director Boubacar Diallo, Deputy Director Benoit Joseph Diarra and Accountant Djira Sissoko.

Dates visited: April 11, 12, 17 and 28, 1980.

Assumption: CAS would be subsidized for a few years but was then expected to become a profit-making operation.

Brief History: The idea of a West African poultry project germinated in the 1960's, cooperating countries to be Mali, Senegal and Mauritania. After operations started, the three-country cooperation did not last long leaving Mali to go it alone.

Construction of the CAS plant started in 1967. Operations started in 1971. The regional plan within Mali was put into operation in 1976. Presently four out of seven regions are covered.

Financing was provided by GRM, US AID, PL-480 funds and others.

Facilities: They consist of an office and hatchery building, three chick rearing houses, twelve floor laying houses, feed mill, feed and ingredient storage building, nine houses for laborers and a water tower. All appeared to be clean and well maintained.

RECOMMENDATIONS WHETHER OR NOT GRM KEEPS CAS

CVL should be responsible for the overall disease program.

Training programs should be instituted, especially for veterinarians trained in poultry pathology. Details can be found on pages 26 & 27.

RECOMMENDATIONS GRM-CAS SHOULD CARRY OUT IF GRM RETAINS OWNERSHIP AND

CONTINUES OPERATION

Hatchery

Recommendations: Order a standby generator, an air conditioner and

incubator spare parts. Keep the floor wet down when machines are running. If new machines are ever ordered, the blocks or skids on which they are mounted should be placed in pans containing oil to prevent termites from reaching the machines.

Basis for Recommendations: The hatchery contains five Robbins incubators each with 70,000 egg capacity three of which are not working, two Robbins hatchers one of which is not working, and one locally built machine in which the hatcher compartment is used occasionally. Termites are damaging these machines. There are frequent current interruptions which result in low hatchability.

In 1979, 150,963 chicks were hatched for the use of CAS, distribution to regional centers, sold to farmers and exported to Guinea. Straight-run (not sexed) chicks were sold for 250 MF each. Hatchability for the year was 53%.

#### Chick Rearing and Laying Houses

Recommendations: Place more waterers in each pen. Scrub waterers daily. Paint roofs white. Debeak chicks at day-old. Operate houses on an "all-in, all-out" basis; do not mix different age groups in the same house.

Basis for Recommendations: Birds need a good supply of water especially during hot weather. Scrubbing waterers daily will reduce the build-up of bacteria and parasites. White painted roofs will reflect heat. Debeaking chicks should reduce feather picking and cannibalism. Mixing birds of widely different ages in the same house increases losses from mortality and morbidity.

#### Feed

Recommendations: With the ingredients available, make the best possible ration to fulfill the nutrient requirements of the birds. Consider the use

of vitamer-mineral premixes. Have Babcock or CNRZ make periodic analyses of feed ingredients and finished feeds. Continually check ingredients and feeds for molds, insect and rodent damage; fumigate when necessary.

Basis for Recommendations: The feed consists of rice, millet, sorghums, maize (corn), peanut by-products, fish meal, meat meal and shells. Because the availability of ingredients varies widely and what is found varies in quality, analyses should be made frequently. Corn was imported from Thailand and that portion declared unfit for human consumption ended up in poultry feed. Molds and moldy feed cause lowered egg production. A constant search apparently must be made for ingredients and a close eye kept on costs. Corn is available on the open market but probably at a price twice the official price of about 70 MF/kg. which would make it prohibitive to put into poultry feed if the sale price of feed is 150 MF/kg.

#### Disease

Recommendations: Take a sample of birds to CVL at least every two months for autopsy so as to institute a disease and parasite control program. Follow CVL recommendations for the vaccination and parasite control programs. Continue to vaccinate for Marek's Disease; Newcastle and Fowl Pox. Test every three months for Salmonella pullorum. To reduce morbidity (culls) follow the management recommendations given for egg production.

Basis for Recommendations: Disease - deaths and morbidity (culls) - is the major CAS problem as shown by the following data from 1979 and that collected from the laying houses for the period from start to April 16, 1980:

CAS 1979 Housed Birds

<u>Date hatched</u>	<u>No. housed</u>	<u>No. dead</u>	<u>No. culled</u>
4&25/11/77	2,924	397	2,527
23/3/77 & 22/4/77	1,071	102	969
6&12/5/78	2,206	724	324
21&28/4/79	<u>1,912</u>	<u>121</u>	<u>38</u>
Totals	8,113	1,344	3,858
%'s		16.5	47.5
Total % dead & culls			64%

CAS 1979 Imported Parent Stock

<u>Date Imported</u>	<u>No. imported</u>	<u>No. dead</u>	<u>No. culled</u>
10/2/79	2,491	764	1,727
21/4/79	2,356	335	109
25/8/79	2,700	648	-
13/11/79	<u>2,000</u>	<u>196</u>	<u>-</u>
Totals	9,547	1,943	1,826
%'s		20.3	19.1
Total % dead & culls			39%

CAS Laying Houses Gathered April 16, 1980

<u>House No.</u>	<u>% Mort. Start to 16/4/80</u>	<u>Approx. Age &amp; Kind</u>
1	14.8	9 mos. Rhode Island Reds
3	55.3	24 mos. Babcock
4 & 5 combined	29.0 74.0	12 mos. Babcock 5 mos. Barred Plymouth Rocks
8	2.0	7 wks. Babcock
9	6.6	7 wks. Babcock
11	5.2	7 wks. Broilers

### Egg Production

Recommendations: Feed the best possible ration supplemented with a vitamin-mineral premix to parent stock and chicks. Follow CVL's vaccination and parasite control programs. Provide adequate feeder (10 cm./bird), waterer (2.6 cm./bird) and floor (0.3 sq. meters/bird) space. Find the management factors (out of feed and water, external parasites, moldy feeds, etc.) and/or disease factors (worms, epidemic tremors, chronic respiratory disease, mycoplasma infections, etc.) causing large numbers of culls and correct them. Operate houses on an "all-in, all-out" basis. Do not mix birds with widely differences in ages in the same house. In extremely hot weather (above 38°C), spray the litter with water and stir the litter.

Basis for Recommendations: 1979 egg production for CAS was 537,571 eggs laid by 8,113 birds housed at about six months until they were 18 months of age. Each bird laid 66 eggs or 18%. This percentage figure is calculated by dividing the number of eggs laid by the production period of 365 days, and combines egg production and mortality. A reasonable percentage should be 45-50%. The percent egg production data collected by me calculated from the number of birds on hand at the start of April from April 1 to April 16, 1980, was 50%, 50% and 44% in Houses 1, 3 and 4. Considering the hot weather, these egg production figures are acceptable, but realize that it is only for a two-week period and does not include mortality. Overall low egg production throughout the 365-day laying period is CAS's number two problem.

### Utilization of Laying Houses

Recommendation: By following the recommended management and disease control programs, and attaining the reasonable production parameters shown (see page 18) CAS should reach 80% utilization.

Basis for Recommendation: Houses were being used at 75% capacity. Theoretical capacity of each house is 2,000 birds, but because of mortality utilization never averages 100%. With 12 houses with a total capacity of 24,000 birds, 12,863 birds were on hand April 1, 1980, for a utilization rate of 50%.

#### Parent Stock Imports

Recommendation: Import smaller numbers of parent stock than CAS is currently importing, the number to depend upon the number of commercial chicks to be produced, and attaining the reasonable production parameters.

Basis for Recommendation: Parent stock chicks are imported, grown to six months of age and mated after which they produce hatching eggs which after incubation result in day-old commercial chicks for sale to farmers. Attaining reasonable production parameters of 15% rearing and 25% laying house mortality, 50% egg production and 65% hatchability, each 1,000 parent stock chicks imported should produce 70,605 day-old commercial chicks. From these data and CAS's calculated demand for commercial chicks, CAS can arrive at the number of parent stock chicks they should import.

#### Personnel

Recommendations: The Director should have a business, accounting and marketing background. He should be charged with the overall responsibility for making a profit. The Deputy Director should have a technical poultry background and be charged with the day-to-day operation of the farm, hatchery and feed mill. If one person could be found with the above talents, he should be able to run the whole of such a relatively small operation.

It is recommended that the labor force at CAS be reduced from 97 to 43 if possible. Suggested labor parameters are as follows:

Central Office	1 Director 1 Deputy Director 1 receptionist 2 accountants
Laying Houses	12 men
Chick Rearing Houses	1 man
Feed Mill	1 supervisor 7 men - mixing, bagging & laborers
Hatchery	2 men
Maintenance Crew	10 men
Guards	5 men
Total	43 people

Basis for Recommendations: There are 97 people employed at CAS with a payroll of 7,000,000 MF paid from CAS operations plus a GKM payroll of 39,381,000 MF. The total payroll for management and labor is 46,381,000 MF per year (1979). Twelve people are employed in the laying houses, one in the chick rearing houses, three in the hatchery and ten in the feed mill. The remaining 71 people consist of five guards, office and maintenance people, and the Director and Deputy Director. Considering the laying houses at full capacity (which they are not because of mortality), one person is on the payroll for each 268 birds. Contrast this with the total personnel at CVL, take into account the differences in operations, and the only conclusion is that CAS is extremely labor inefficient.

If the recommended 56% reduction in labor and management costs could be made, there would be a saving of 17,315,568 MF per year for both a commercial egg operation and a parent stock-hatchery operation if operated at full capacity.

#### Marketing

Recommendations: CAS should sell their products - eggs and poultry meat -

at market prices. A cost accounting system should be set up so there would be a basis for determining the sale price of chicks, feed and other products.

Produce a quality egg by having clean nesting material, gather eggs four or five times daily, store them in a cool room or under refrigeration and deliver them to the stores every other day. If no cool or refrigerated room is available, deliver eggs to stores every day. Make sure eggs sold to stores are clean; buff off any dirt spots with fine sandpaper.

Basis for Recommendations: CAS has no marketing plan. Customers come to them to buy chicks, feed, fowl, broilers and biologics. The regional centers send their orders to CAS.

A market survey of prices paid farmers for eggs and poultry meat showed that they received about 70 to 80 MF per egg and 1,200 to 1,800 MF per bird. CAS sold eggs for 60 MF each and poultry meat (fowl and broilers) for 427 MF each. If CAS had sold eggs and poultry meat at market prices, figuring an average market price per egg of 75 MF and 1,500 MF per meat bird, they would have realized about 21,000,000 MF additional revenue.

The following on chick and feed production costs may or may not be reliable because the data to substantiate them was not available. The costs given were 360 MF to produce one chick which was sold for 250 MF. The cost for one kg. of feed was 185 MF and was sold for 150 MF/kg. Thus, the loss (production cost less sale price) was 36,519,665 MF on the 1,043,419 kg. of feed sold, and 8,072,020 MF on the 73,382 chicks sold for a total loss of 44,591,685 MF.

#### Financial

Recommendations: A cost accounting system using all costs must be put into operation so that production costs by product lines will be known.

Products should be sold at their production cost plus a reasonable profit, or at least, at market prices. Tighter controls on where each product goes - to CAS, sold to customers, to each of the four operating regional centers, mortality, disappearance - should be instituted.

Basis for Recommendations: The following are CAS 1979 Sales, Expenses and Supposed Profits:

<u>Item</u>	<u>No. Sold</u>	<u>Total Sales, MF</u>	<u>Price/Unit, MF</u>
Chicks	73,382	18,670,450	254
Feed	1,043,419 kg.	104,339,960	100/kg.
Biologics	-	8,309,045	-
Eggs	166,458	10,052,630	60
Fowl & Broilers	18,405	7,867,975	427
TOTAL SALES		149,240,060	
TOTAL EXPENSES		148,348,060	
SUPPOSED NET PROFIT		892,000	

The 20,000,000 MF GRM grant (subsidy) and the 39,381,000 MF GRM paid in salaries are not included in the above expenses, and they should be. When included, the CAS operation shows a loss of 58,489,000 MF for 1979.

In 1979, CAS hatched 150,963 chicks. Of this total, only 73,382, or 49% were sold and paid for. Records to show where they went were not available. Some went to regional centers, some were not paid for, some were raised as started chicks, there were losses from mortality and others were simply "lost".

CAS had receipts of 104,339,960 MF from the sale of 1,043 mt. of feed sold at 100 MF/kg. Yet the sale price of feed is supposed to be 150 MF/kg. Why the difference and to find out where the rest of the feed might have gone was impossible to find out. Some was used by CAS and some sent to

the regional centers, but the amounts were unknown. If the previous feed production cost of 185 MF/kg. is anywhere near accurate as reported in the marketing section, there was a loss on each kg. sold of not 35 MF but of 85 MF.

The 20,000,000 GRM subsidy to CAS is used by CAS to buy chicks, feed and biologics with CAS keeping all revenues from the sale of these products.

The financial affairs of the regional centers are almost impossible to separate and understand because of the lack of adequate data. It is impossible to separate the income from sales of chicks, feed and biologics of each of the centers or for all centers combined. The total money they get from sales is deposited in a local bank. Each center draws on this account for operating expenses. Some may be brought back to CAS for large purchases. The end result is total sales less expenses for each center, but no breakdown on sales for each product.

Recommendation for Regional Centers: If it is decided that GRM should keep the centers and have CAS supply them with chicks, feed and biologics, the centers should pay CAS the wholesale cost (cost of production plus a reasonable profit). The regional centers would sell these items to farmers at retail prices, the difference being the gross profit to the centers. It might take two or three years for the centers to build up to a profitable level, and so they would have to be financed by some means. This system works in a large part of the world and so it should work in Mali. If not, consider closing the centers down.

SUMMARY OF LOSSES FROM THE MARKETING & FINANCIAL SECTIONS

From the data gathered which in many cases were incomplete, unavailable or questionable, the following losses show:

Loss of revenue by selling eggs & meat below market prices	21,000,000
Loss on selling feed below production cost	36,519,665
Loss on selling chicks below production cost	8,072,020
Loss on feed sold @ 100 MF/kg. instead of 150 MF/kg. if production costs are 185 MF/kg.	52,170,950
Loss on 1979 Sales, Expenses & Supposed Profits when the 20,000,000 GRM subsidy & the 39,381,000 MF GRM payroll are included in Expenses	58,489,000

TOTAL LOSSES BY SELLING BELOW MARKET  
PRICES, BELOW THE COST OF PRODUCTION,  
AND NOT INCLUDING GRM SUBSIDY &  
PAYROLL COSTS IN EXPENSE FIGURES

176,251,635 MF

CAS Services to Farmers

Recommendation: CAS should charge farmers for service performed.

Basis for Recommendation: Other than extension assistance with production matters, the only one mentioned was CAS service to get broiler chicks for customers. CAS handles all transactions to import broiler chicks for the farmer. The farmer pays all costs, but pays CAS nothing for services performed.

Provisions of the Requested 800,000,000 MF Financing

The breakdown of the 800,000,000 MF request is as follows:

<u>Item</u>	<u>1978 MF</u>
Feeds for one year	324,900,000
Parent Stock & 4 new houses	80,595,000
Biologics	38,213,700
New incubators & repair old ones	70,000,000
10-ton feed truck & equipment	70,236,000
200 KVA generator	22,000,000 (est.)
Chick truck	7,000,000
Car for extension agents	3,000,000
10 motorcycles for extension agents	2,500,000
4 pick-up trucks for centers	12,000,000
Salaries	44,942,320
Water & Electricity	7,000,000
Gas & Oil	8,000,000
General Maintenance	6,500,000
Build Segou Center	20,000,000
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TOTAL	716,887,020
Plus 10% -1979 inflation	71,688,702
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GRAND TOTAL	788,575,722
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Recommendation: It is not recommended that an investment of this size be made in CAS. They have not been able to utilize the facilities and resources they have efficiently. It is also a poor budget request showing a lack of accounting expertise by mixing capital items in with operating expense items.

APPENDIX

Costs and Returns for a Commercial Layer Operation	Pages 18 & 19
Costs and Returns for a Parent Stock Operation	Pages 20 & 21
Costs and Returns for a Broiler Operation	Page 22
Visits	Pages 23, 24 & 25
Suggested Technical Training Programs	Pages 26 & 27

NOTE: ALL ESTIMATED COSTS AND RETURNS ARE BASED ON MINIMAL ACCEPTED MANAGEMENT PRACTICES AND DISEASE CONTROL. THE AVERAGE NUMBER OF BIRDS SHOWN IS HALF THE MORTALITY RATE BECAUSE THE BIRDS THAT DO DIE DO NOT ALL DO SO AT ONCE.

APPENDIX 1

ESTIMATED COSTS AND RETURNS PER 1,000 COMMERCIAL LAYERS, MF

Parameters: 15% rearing mortality, 20% laying house mortality and 50% egg production from 6 to 18 months of age. Feed cost is 150 MF/kg.

Chicks and Rearing Costs (day-old to 6 months)

Chicks @ 250 each	250,000
Feed - 10 kg./bird - Average no. birds 925	1,387,500
Medication - 30 MF/bird	27,750
Electricity - 20 MF/bird	18,500
Depreciation - 20 MF/bird	18,500

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TOTAL	1,682,250
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Laying House Costs (6 to 18 months of age)

Feed - 60 kg./bird - average no. birds 765	6,885,000
Medication - 30 MF/bird	22,950
Depreciation - 100 MF/bird	76,500

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TOTAL	6,984,450
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Labor and Management Cost


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	1,932,541
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TOTAL COSTS	10,599,241
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Returns

139,612 eggs @ 75 MF each	10,470,900
680 spent hens @ 1,500 each	1,020,000

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TOTAL	11,490,900
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TOTAL RETURNS	11,490,900
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TOTAL EXPENSES	10,599,241
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PROFIT	891,659
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ESTIMATED COSTS AND RETURNS PER 1,000 COMMERCIAL LAYERS, MF, (cont.)

This is an 18-month operation so profit per year per 1,000 layers would be 594,439 MF. If labor costs were reduced 56% as recommended, there would be an additional profit of 1,082,223 per 1,000 layers for 18 months, or 721,482 per year.

Housing 2,000 layers per house in 12 houses would result in a 24,000 layer operation. Based on the parameters used, total profits should be 21,399,816 MF for 18 months or 14,266,536 MF per year. If labor costs were reduced 56% as recommended, there would be an additional profit of 25,973,352 MF for 18 months, or 17,315,568 MF per year.

Total profits of 31,582,104 MF per year could be realized if all recommendations were successfully followed and all parameters reached.

APPENDIX 2

ESTIMATED COSTS AND RETURNS PER 1,000 PARENT STOCK, MF

Parameters: 15% rearing mortality, 25% laying house mortality, 50% egg production of which 80% are hatching eggs and 65% hatchability.

Feed cost is 150 MF/kg.

Chicks and Rearing Costs (day-old to 6 months)

Chicks @ 2,600 MF each	2,600,000
Feed - 10 kg./bird - average no. birds 925	1,387,500
Medication - 30 MF/bird	27,750
Electricity - 20 MF/bird	18,500
Depreciation - 10 MF/bird	9,250
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TOTAL	4,043,000

Laying House Costs (6 to 18 months of age)

Feed - 60 kg./bird - average no. birds 744	6,696,000
Medication - 30 MF/bird	22,320
Depreciation - 10 MF/bird	7,440
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TOTAL	6,725,760

Incubation Costs

Hatching eggs - 100MF/chick X 70,605	7,060,500
Electricity - 10 MF/chick	706,050
Depreciation - 1 MF/chick	70,605
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TOTAL	7,837,155

Labor and Management Cost

1,932,541

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## TOTAL COSTS

20,538,456

Returns

70,605 chicks sold @ 250 MF each	17,651,250
27,156 market eggs sold @ 75 MF each	2,036,700
638 spent hens sold @ 1,500 MF each	957,000
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ESTIMATED COSTS AND RETURNS PER 1,000 PARENT STOCK, MF (cont.)

TOTAL RETURNS	20,644,950
TOTAL COSTS	20,538,456
PROFIT	106,494

This is an 18-month operation so profit per year per 1,000 Parent Stock would be 70,996 MF. If all facilities were devoted to a Parent Stock-Hatchery operation, the 18-month profit would be 2,555,856 MF and 1,703,904 MF per year. If labor costs were reduced 56% as recommended, there would be an additional profit of 1,082,223 MF per 1,000 Parent Stock, or 25,973,352 MF for 18 months. With full capacity of 24,000 birds, the profit per year would be 17,315,568 MF.

If the whole operation was a Parent Stock-Hatchery one with 24,000 birds, chick output per year using the parameters shown at the beginning of this section would be 1,129,680. If the demand is not there for this number of chicks, the operator should consider half or 12,000 birds in this operation and the other half in a commercial layer operation. Profit for 18 months would be 11,977,836 MF or 7,985,224 MF per year.

These estimated costs and returns are based on reasonable parameters of 15% rearing and 25% laying house mortality, 50% egg production and 65% hatchability. CAS performance records for 1979 for the same traits were 23%, 64% (dead & culls), 18% and 53% respectively. Using CAS performance figures but adding what they received for cull birds, the loss for the 8,000 Parent Stock they had in 1979 was about 29,000,000 MF.

Total profits of 19,019,472 MF per year could be realized if all recommendations were successfully followed and all parameters were reached.

APPENDIX 3

ESTIMATED COSTS AND RETURNS PER 1,000 BROILERS, MF

Parameter: 15% growing mortality. Feed cost is 150 MF/kg.

Costs (day-old to 10 weeks of age)

Commercial chicks imported @ 250 MF each (est.)	250,000
Feed - 7,200 kg.	1,080,000
Medication - 20 MF/ bird	20,000
Electricity - 20 MF/bird	20,000
Depreciation - 10 MF/bird	10,000
Labor and Management Cost	1,932,541
	<hr/>
TOTAL COSTS	3,312,541

Returns

850 sold @ 1,500 each	1,275,000
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TOTAL RETURNS	1,275,000

TOTAL COSTS	3,312,541
TOTAL RETURNS	1,275,000
	<hr/>
LOSS	(2,037,541)

Four batches of 2,000 each could be grown in each house per year. With 12 houses, 96,000 could be grown per year. The loss per 1,000 would be 2,037,541 MF. The loss for the year would be 195,603,936 MF. If labor costs were reduced 56% as recommended, the loss would still be substantial.

CAS raises occasional groups of broilers on a haphazard basis. Production and cost figures were unavailable. Even if they were available, they are probably losing more money on them than if they were correctly grown.

APPENDIX 4

VISITS

4/10/80 - Orientation at US Embassy and AID/M. Reviewed work program and planned schedule with Larry Harms, AADO, Myron Smith, ADO. I met Mahmoudou Cisse, Administrative Assistant Livestock, without whose help and guidance, it would have been impossible to complete the field trips in the time we did.

Samba Sidibe, Director General, Service d'Elevage. Various ideas were broached to him about reducing the size of CAS, changing it's scope, etc. He was very open-minded about all suggestions. It was suggested that the regional centers might be divorced from CAS.

I read through the AID/M file on CAS from its inception to the final report dated June 15, 1976. There was no report that was not critical to a greater or lesser extent. My impression was that CAS tried to go too fast too soon. The classic statement was made in the final report by Robert L. McDill, PMA, ADO, Dakar, "It was an innovative approach that should not be repeated."

Irving Rosenthal, Attache for Food Development Programs, US AID/Rome, gave me an insight into the field workings of AID programs. He knew of the CAS project. He told me that AID and the U.S. Ambassador may have small amounts of money available for "emergency-type" projects. He also suggested that the World Food Organization might be considered a possibility for securing poultry feedstuffs for Mali.

4/11/80 - I visited Sidney Lenky, AID/M Economist, to see if he had a line item in the 1979-80 Mali National and Regional Combined Budget for CAS. He did not have it.

4/12/80 - I met Mike Strong at CAS. He is Technical Sales Manager Africa, for Babcock Farms, Ltd., 315-319 Mill Rd., Cambridge CB1 3DF, England. Tel. 42031/4. Telex 817450. Mike and I compared notes on the management

of CAS, and agreed that their main problems were disease, feed, egg production and management deficiencies. Babcock has a free feed analysis service. Babcock offered CAS up to three places in their intensive two-week poultry technical school, Ithaca, NY. Students would have to pay their transportation to and from Ithaca. Babcock pays all else including simultaneous translation.

Gaoussou Kouma, Director of the Centre National Research Zootechnique (CNRZ). CNRZ was at first connected with CAS, but is now independent and GRM financed. Their main areas of research are in the fields of genetics, nutrition, animal health and agronomy. Of particular interest in the poultry field, they are crossing RIR's with Koko-Chae's trying to produce a bird with disease resistance and a small body size.

4/14/80 - Ronald Levin, US AID/M Director. At this meeting with Myron Smith and Larry Harms present, Mr. Levin instructed me to make an appraisal of CAS operations and to report my findings and recommendations.

Dr. Mody Toure, Director, and Dr. Frank Olvey, Veterinary Advisor, Central Veterinary Laboratory (CVL), Sotuba, told me that the objectives of CVL were to produce livestock vaccines (no poultry vaccines are produced), to conduct research on insect-borne diseases of livestock, and to provide diagnostic services for large animals and poultry. CVL offered to autopsy a sample of birds from CAS every two months and to review CAS's vaccination and parasite control programs so as to help them with their mortality and morbidity problems.

4/17/80 - I visited two commercial farms in the Sotuba-Bamako area. Sory Coulibaly has ten houses with 840 layers and 2,134 chicks at present. He is getting 100 to 150 eggs per day. Jean Marie Kone showed us his home installation, but did not have the time to show us his larger operation.

4/18/80 - Centre Avicole Segou. Director Philip Dembele showed us their facilities which consisted of one small poultry house containing six pens with yards. One pen contained ten layers. Another contained 100 to 150 chicks that were small for their age, uneven in body weight and poorly feathered. The other four pens were empty. There is a small building for feed storage, but there was not much feed in it. The rest consisted of a large bare lot.

The Centre has two other employees. The Centre sold 5,000 chicks in March and April. If a customer wants technical help from the Centre, he must pick up the technician, drive to his farm and then return the technician to the Centre.

We visited two commercial farms belonging to Toure and Bakoraba Kane. Disease is their big problem.

4/22/80 - We visited the Jijisem Branch of Somiex, Malimag, Morel and Prom, the Legume Market, Dibida Market and Hotel De l'Amitie to inquire if they had an adequate supply of eggs. Their universal answer was that they could sell more eggs if they had them, especially during the hot season. Prices paid farmers ranged from 55 to 80 MF per egg with the average being between 70 to 80 MF. Eggs were sold to the consumer for 60 to 90 MF per egg. Only two of these stores or markets could tell us the number of eggs sold per month. They ranged from 10,000 to 40,000. Two complained of poor egg quality-small, dirty, flat yolks and albumen. Prices paid farmers were the same no matter what size or quality. We were not successful in talking with the man who sells "stamped" eggs.

APPENDIX 5

SUGGESTED TECHNICAL TRAINING PROGRAMS

ASPAU (AFGRAD) - This is the African Program for study at American Universities. I do not know the details, but was told of it by Dr. Mody Toure, CVL Director, who was a beneficiary when he studied at the University of California, Davis.

INSTITUTE POLYTECHNIC RURAL MALE - Hire a bilingual visiting poultry professor to teach a short course of about four weeks duration. Consider a professor from France, Quebec, Canada, or the U.S. If enough students attended, this should be a minimal cost program.

TWO-YEAR COURSES - There are two-year courses which include poultry such as the Thomson School of Agriculture, University of New Hampshire, Durham, NH. Most courses are devoted to agriculture rather than the usual university programs of study.

SUPPLIERS - Suppliers with technical staffs such as Babcock Farms can be helpful by making visits to CAS and customer farms, sponsor technical schools, provide feed analysis and disease information. Some drug companies also have technical staffs. As a rule, the more one buys from them, the more free service they will provide.

VETERINARIAN TRAINING - Unfortunately most veterinarians know very little about poultry pathology. This is not their fault as most veterinary schools emphasize large and small animals. It should prove a good investment to send a veterinarian to the U.S. for a year to study under a qualified poultry pathologist. Upon his return to Mali, he could conduct a series of short courses for other veterinarians.

If this is not possible, consider using Dr. Mody Toure, CVL Director, if he has the time, and his staff to conduct short courses and/or "on-the-job" training in poultry pathology. Dr. Toure has had training

SUGGESTED TECHNICAL TRAINING PROGRAMS (cont.)

in this field at the University of California, Davis. Birds for study should be in ample supply from CAS and nearby farms.

It is recommended that one or both of these programs be implemented because disease is the number one problem at CAS and on commercial farms in Mali.

"ON-THE-JOB" TRAINING - Arrange for two CAS hatchery people and two farm people to be placed in two hatcheries and on two commercial farms in France. The scheme would be for GRM to pay their transportation to and from France. The hatchery owners and farm owners would pay the students a living wage, but not as much as a French worker. In return, the owners would instruct the students in the hatchery and production phases of the business. The time period could run from six months to a year. Upon the students' return to Mali, they could put their new knowledge to use in the CAS operations and pass it on to others. If successful, it could be repeated with others. Deyrick, France, who sells parent stock to CAS might be helpful in finding locations for students to get this type of "on-the-job" training.