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UNCLASSIFIED  
CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) - PART I

Report Symbol U-447

1. PROJECT TITLE  Control of Vertebrate Pests			2. PROJECT NUMBER 931-0473	3. MISSION/AID/W OFFICE USAID/SUDAN
4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) <u>650-80-04</u>			<input checked="" type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION	
5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING	
A. First PRO-AG or Equivalent FY <u>77</u>	B. Final Obligation Expected FY <u>81</u>	C. Final Input Delivery FY <u>81</u>	A. Total : <u>500,000</u>	7. PERIOD COVERED BY EVALUATION
			B. U.S. approx: <u>450,000</u>	From (month/yr.) <u>5/77</u>
				To (month/yr.) <u>2/80</u>
				Date of Evaluation Review <u>02/21/80</u>

B. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

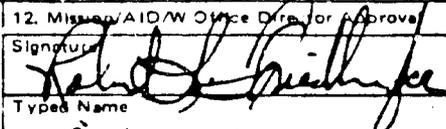
A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., sirgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Analyze local currency budgets of both this project and the Local Currency Support Fund PROAg to determine availability of LS 20,000 needed to finance renovation of annex at Wad Medani Research Station for project activities.	RCarpenter KFrith	3-31-80
2. Prepare estimated costs and outputs to extend and/or expand project from 5/81 and to 5/84.	Evaluation team	2-29-80
3. Determine whether project should be terminated 5/81, extended as a centrally-funded project or as a bilaterally-funded project.	Mission Director	5-31-80
4. Inform DWRC whether present resident biologist will be replaced with TDY or resident scientist upon his departure 10/29/80.	Mission Director	6-01-80

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS			10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT	
<input type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input checked="" type="checkbox"/> Other (Specify) <u>Documentation depends on Decision 3.</u>	A. <input type="checkbox"/> Continue Project Without Change	
<input type="checkbox"/> Financial Plan	<input type="checkbox"/> PIO/T	<input type="checkbox"/> Other (Specify)	B. <input type="checkbox"/> Change Project Design and/or	
<input checked="" type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C		<input type="checkbox"/> Change Implementation Plan	
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P		C. <input type="checkbox"/> Discontinue Project	
			D. <input type="checkbox"/> Depends on Decision 3.	

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Ray Carpenter, USAID/S Project Monitor  
Wayne Bohl, DWRC Project Leader  
John De Grazio, DWRC/Denver  
Dr. Osman Gameel, ARC, Wad Medani, Sudan  
Hassan Abbas, Regional FAO, Nairobi  
ArTene O'Reilly, USAID/S Evaluation Officer

12. Mission/AID/W Office Director Approval

Signature:   
Typed Name: Gordon K. Pierson  
Date: 6-21-80

### 13. Summary

The Vertebrate Pest Control project is a world-wide, centrally-funded, research activity, managed by DSB/AID/W and monitored by USAID/SUDAN. The regional project covering five countries - Ethiopia, Kenya, Somalia, Tanzania and Sudan - was transferred from Northern Tanzania in 1977 after the dissolution of the East African Community. Seventy percent of the project's activity has subsequently taken place in Sudan under the direction of a resident biologist from the Denver Wildlife Research Center under PASA Agreement signed with the U.S. Fish and Wildlife Service in 1968.

The project was initially placed in the Plant Protection Department (PPD) of the Ministry of Agriculture, Food and Natural Resources (MAFNR). In the Spring of 1979 there was a consensus that the project would be more appropriately placed in the Agricultural Research Corp. (ARC.) With the transfer accomplished, a more productive working atmosphere has been evident. Facilities and experimental field sites were made available at several research stations and Sudanese support personnel actively engaged in the program were seconded from PPD and given on-the-job training. The Agricultural Research Corp. while responsible for all agricultural research within Sudan has a minimal capacity for a vertebrate pest research program at this time. The Agency is well staffed in complementary disciplines thus enabling it to facilitate integrated rural and inter-disciplinary solutions.

A major constraint to project operations in the beginning was inadequate funding. This was partially alleviated during 1979 by the USAID, with GOS concurrence, making LS 50,000 in P.L. 480 local currency funds available for project activities. Although a major portion of the physical and financial constraints have been removed, approximately \$60,000 is still needed for field equipment/vehicle and laboratory facility expansion.

The evaluation revealed that the project is behind schedule in achieving its outputs. However, since a Logical Framework matrix had not been prepared, the outputs, the purpose and goal statements, as well as the inputs required, had never been clearly delineated. In addition, the loss of two experienced counterpart personnel to FAO during the early phase of the project reduced productivity. There will be a short-term remedy of this situation in the near future when two MSc degree participants return after completing their academic training in the U.S. and research work at the Denver Wildlife Research Center. At the present time, however, PPD has agreed to only a one year secondment of one of the participants to the project.

Preliminary information on the extent and magnitude of the bird damage to food crops in the Sudan has been assembled, analyzed and included as attachment A. Similar information on rodent damage has not been gathered since a resident biologist on rodent research was never added to the project team as originally envisioned.

While research progress has been achieved, detailed research reports have not yet been made available to the GOS and A.I.D. This situation will be corrected by DWRC instituting a separate Annual Report for the Sudan portion of the project. These reports will contain detailed information concerning study plans, methodology, findings and recommendations for individual research activities.

New work plans have been formulated with specific studies given priority. TDY support has increased during FY 80 while laboratory research at DWRC is progressing. The resident biologist scheduled to complete his tour in November, 1980 will be replaced only if the project is extended beyond May, 1981. Otherwise the period of November to May will be covered by DWRC TDY personnel. DWRC and the evaluation team do not anticipate that the purpose will have been achieved without an extension of the project.

#### 14. Evaluation Methodology

The reason for the evaluation was to assess progress achieved since 1977 and to establish a benchmark from which future progress may be noted. The evaluation team consisted of DWRC's resident biologist and their Chief of International Programs from Denver; USAID/Sudan's Agricultural Project Monitor and Program Evaluation Officer; with contributions from the Plant Protection Department's former Director who is presently with FAO's regional office in Nairobi; and a representative from the Agricultural Research Center in Wad Medani. A Logical Framework matrix was prepared which permitted clarification of project design and a base upon which future evaluations can be made. Data sources were DWRC's project reports.

#### 15. External Factors

The project was transferred from the Plant Protection Department (PPD) where facilities, storage areas, vehicle and equipment maintenance, animal holding pens, and experimental field sites were insufficient to support project activities, to the Agricultural Research Corporation (ARC) in July, 1979. ARC facilities are being renovated and experimental field sites made available at Shambat, Soba and Wad Medani.

A shortage of fuel, equipment and spare parts in Sudan have had a negative impact on project operations. The Government's crisis situation with respect to its balance of payments situation has curtailed the abilities of both GOS agencies and private entrepreneurs to import these commodities. In addition, rainy season flooding results in disrupted services, amplifying the shortages brought about by foreign exchange constraints.

## 16. Inputs

Inadequate dollar financing of the project resulted in ineffective project operations. A victim of this lack of funding was the deletion of a second wildlife biologist to DWRC's field team to conduct research on food crop damage caused by rodents. The purchase of appropriate vehicles and laboratory equipment was also stymied because of insufficient funds. The resident biologist has had to use his ingenuity in securing a loan of deadlined vehicles from FAO and the PPD that he could manage to place in operation and maintain. The USAID was able in September, 1979 to make local currency funds available but there continues to be a shortage of dollar financing.

DWRC TDY field support has not always been as timely as it might have been. Project management split between a Washington based bureau and a USAID "monitor" has not enhanced solutions to the continuous operational problems which beset a project in the Sudan.

GOS inputs of counterparts, support personnel, office and laboratory space have lagged since the early departure of the PPD Director and the Head of the Bird and Rodent Section. This is in part due to the stringent funding constraints for the PPD and a dearth of trained professionals in ARC which has recently been given the responsibility for this line of research.

## 17. Outputs

One of the main tasks of the evaluation team was to determine the purpose that the project was designed to achieve and the outputs which would achieve that purpose. The Project Agreement signed by the Assistant Under-Secretary of the Ministry of Planning and the U.S. Charge d'Affairs in May, 1977 was the basic document used to review the original intent of the project. The Course of Action, in Section I of the ProAg, states in part that the DWRC will undertake to assist the Government of Sudan in the development of a viable pest management capability in Sudan. The development of this capability will require research and training, and the institutionalization of the pest management program.

Projected Results in Section II., states that upon completion of the project it is expected that the assistance provided will contribute towards the increase of available human food supplies in Sudan through the achievement of the following objectives:

1. Appraisal of the nature and magnitude of food losses attributable to bird and rodent activity in Sudan;
2. Development of integrated bird and rodent control programs within Sudan;

3. Development of an indigenous Sudanese capability to cope with problems of food losses due to bird/rodent activity; and

4. Institutionalization of Sudanese research control programs.

The team, keeping in mind that the project was centrally-funded research which might not have had a precisely specified terminal point, nevertheless, felt that the development of safe, effective, and economic control techniques that could be used on both small traditional and modern farms to reduce crop losses caused by birds and rodents had been and should continue to be the purpose that DWRC was trying to achieve. The following were identified as major outputs to achieving the purpose:

	<u>% Completed</u>
1. Survey of population and movements of Quelea and other important species.	60

Throughout the life of the project, base information on life history, food habits, distribution, speciation, populations, and movements of Quelea has been obtained. The data are available to the project and the Government of Sudan and were acquired through literature surveys, FAO and GTZ (German Technical Assistance) publications, and project activities.

2. Damagement Assessment of food losses due to bird and rodent activity.	60
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Preliminary information on crop losses and the economic impact of bird damage in Sudan and other African countries has been compiled. A recent qualified analysis indicated that in the Sudan damage to grain sorghum by Quelea could be \$28 million, or higher, annually; this represents about a 15 percent loss (280,000 metric tons) of total production.

The extent of rodent damage in Sudan is not tabulated at this time. The most important agricultural rodent pests in Sudan have been identified as Arvicanthis sp. and Mastomys sp. which damage sorghum, wheat, rice, groundnuts, and vegetables. In the Gezira alone, LS 2 million was spent last year on combating this problem; damage was estimated at 30 percent on wheat and groundnuts, according to Dr. Gameel of ARC.

Information has been assembled on crops and areas that are affected by vertebrate pests, species causing problems, season when damage occurs, crop phenology in relation to weather patterns, and other related base data.

3. Damage Assessment techniques developed in cooperation with Ministry of Agriculture Statistics Department.

60

To date, damage assessment data in Sudan has been collected from a number of sources and without standardization of a technique that would enhance the data's statistical reliability. The technique currently employed in the United States is not appropriate for use in Sudan or East Africa. DWRC is working with GOS and cooperating agencies to modify the U.S. method, or to develop one that is more appropriate. However, further refinements must be developed and incorporated during the remaining life of project for a technique which will generate data at acceptable statistical standards.

4. Chemical control methods evaluated.

20

No significant effort has been directed to a comparative analysis of pest eradication versus pest control management techniques (repellents, etc.) The GOS currently employs a method of aerial spraying with toxic chemicals in localized areas at a high cost with only moderate success.

Laboratory tests have demonstrated that methiocarb, registered and widely used in the United States, is highly repellent to the African Quelea. Tableted baits developed and used for field experimentation indicate improvement is needed.

Laboratory tests have also demonstrated the feasibility of breeding sorghums which are both resistant to birds and nutritionally acceptable. In their thesis research work at DWRC the two participants conducted studies to determine the potential of using commercial tree tannins from Africa as an inexpensive topical treatment for protecting cereal crops from bird damage and on the feeding behavior of the Nile rat to develop baits and baiting techniques for use in Sudan.

Planned and current research studies underway both in the laboratory and in the field include inter alia an evaluation of the best method of head spray treatment of methiocarb on small grains being damaged by quelea. An evaluation of chemicals and bait formulations for potential use in field rodent control programs is in progress. In addition, efforts are underway to search for and develop an adhesive to minimize concentrations of zinc phosphide in baits to control A. Niloticus and to enhance the effectiveness of methiocarb and Avitrol for field application.

5. Vertebrate pest control research institutionalized in ARC.

Both ARC and the evaluation team believe that institutionalization could not be achieved without additional inputs to the DWRC field team, e.g., a three year extension of the project to May, 1984 and the addition of a second biologist with experience in control of rodent damage. Adding a second team member would provide not only the expertise that was originally intended as part of the project but the technical advice needed to assist in the training and institutionalization as well.

6. Coordination with organizations conducting scientific research on vertebrate pests.

Coordinating research activities with both FAO and West German (GTZ) scientists in the Sudan as well as with other counterpart agencies within the Region has enabled the DWRC's resident biologist to generate a respectable research output with limited resources. The DWRC is coordinating their research with the FAO and the GTZ to devise more efficient bird pest control measures.

#### 18. Purpose

Evidence indicating progress made in achieving the End of Project Status (EOPS) conditions for the purpose articulated in the previous paragraph is minimal. Since the project is behind schedule and indicators of change had not been previously identified, measuring progress in this area was not possible. EOPS that can be measured during the next evaluation are: (1) an improved methodology being used to assess damage by vertebrate pests; (2) the systematic monitoring of vertebrate pest problems by ARC in cooperation with Plant Protection Agencies; (3) monitoring of newly developed ongoing control programs by ARC and Plant Protection agencies; and (4) research results and recommendations published by ARC that are available to users.

19. Goal/Sub-Goal

The stated overall goal of the project is to increase the available human food supply in East Africa and specifically in the Sudan. A sub-goal, "to decrease crop losses from vertebrate pests in the traditional and pseudo modern sectors", was also identified. The value of crop losses in Sudan alone from these predators range from an equivalent of between \$28 million and \$38 million.

20. Beneficiaries

The primary beneficiaries will be the small traditional farmers who produce grain for either subsistence or cash, in both the North and the South where major bird damage occurs. Secondary benefits in terms of increased availability of grain at lower prices would accrue to people normally in the market economy. Techniques developed as a result of this project would be applicable in other Sahelian and tropical African countries.

21. Unplanned Effects

There have been no unplanned effects to date.

22. Lessons Learned

Contrary to popular opinion the design and implementation of research projects can benefit from the use of a Logical Framework matrix. The matrix ideally should be one of the first steps in the design of a project and then used as a basis for measuring progress during periodic evaluations.

A second lesson is that there must be adequate funding and infrastructure for a research scientist to be effectively utilized. It is anticipated that the location of similar projects in a research organization would produce economies of scale in part due to available infrastructure and the interfacing of complimentary and multidisciplinary research activities. However, such a positive environment will not substitute for equipment and/or facilities peculiar to a specific line of research.

23. Special Comments on Remarks

Not pertinent at this time.

Attachment \_\_\_\_\_

First approximation of Crop Damage in Sudan  
by the quelea.  
(51 pages)

## OPTIONS

The Evaluation team offers the following three options for continuing the project.

I. Terminate project May, 1981.

Bohl would depart October 29, 1980 and DWRC would provide TDY services, within existing budget, to carry on research activities to May, 1981. DWRC would expect to complete the following activities.

	<u>% Completed at Time of Evaluation</u>
5. Paper prepared (published ?) on the life history studies of the quelea.	60
2. An assessment of geographic damage patterns, areas, volumes and values.	60
3. Usable damage assessment techniques for sorghum, wheat millet, rice.	60
4. Experiment station replicate studies completed with methiscarb on:	
a. Sorghum, wheat, millet heads	60
b. pre-immurgent rice seed treatment	0
1. 1st approximation of crop damage in Sudan by the quelea.	90
6. Preliminary study on rodent damage problem.	0
7. Expansion of ARC residue laboratory completed.	0

## BUDGET

<u>Technical Assistance</u>	<u>\$</u>	<u>Funding</u>	<u>LS</u>
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TDY consultants for August-September period (to overlap with Bohl's departure 10/29/80) and for field studies through May 11, 1981. These services would be limited to what the present DS budget would finance.

Training (Costs within present budget )

24 PM 3rd country (Alexandria) BSc  
2 wks at DWRC

	<u>\$</u>	<u>Funding</u>	<u>LS</u>
<u>Commodities</u> (Costs are additional to present budget)			
1 Toyota pick-up	12,000		
Miscellaneous lab equipment	6,000		
<u>Other Costs</u> (Costs are additional to present budget)			
Expansion of lab facilities at Wad Medani			<u>20,000</u>
TOTAL	\$18,000		LS 20,000

II. Extension of project from May 1983, to May, 1984.

DWRC would expect to complete the following activities with a resident biologist, primarily a bird specialist with limited experience with rodents.

1. Initiate studies with Avitrol on other bird species in Sudan, such as golden sparrow and yellow capped weaver.
2. Field replicate studies for methiocarb on quelea completed.
3. Investigate feasibility of nesting material with toxicants and/or reproductive inhibitors.
4. Investigate bait and baiting techniques on quelea and other important bird species.
5. Obtain Sudanese certification for use of methiocarb as a control agent and initiate extension efforts through plant protection agencies.
6. Support planning and research activities of returned participant, specialized in rodent control research.

BUDGET

<u>Technical Services</u>	<u>\$</u>	<u>LS.</u>
Long-Term (36 mo.)	186,000	
Short-Term	5,000	
DWRC backstopping	78,000	
<u>Training</u>		
Long-Term (24 mo.)	34,000	
<u>Commodities</u>		
2 Vehicle	30,000	
Equipment, chemicals office/lab supplies	60,000	
<u>Other Costs</u>		
Housing/Utilities		60,000
Operating Expenses, Reg. Travel		80,000
R/R		1,200
5-T Consultants per diem		13,500
2 Graduate Research assistants	42,000	8,000
Contingency/Inflation	<u>42,000</u>	
Sub-Total	477,000	<u>162,700</u>
25% overhead	<u>119,250</u>	
	\$596,250	LS <u>162,700</u>

III. Expand and extend project from May, 1981 to May, 1984.

This option provides for two long term resident scientists and the institutionalization of the research program as was envisioned in the original Project Agreement. It would require a commitment on the part of ARC to the effect that funds to support the project would be included in their budget, indicating that research activities to control vertebrate pests is one of their priority concerns. It would also require a change in ARC's research organization so that the vertebrate pest control section would be well placed to both balance and benefit from complementary disciplines such as forestry, wildlife and range management. In the proposed new Natural Resources Division consisting of these three sections, vertebrate pest research activities would ultimately emanate from the wildlife section.

The second team member would be a wildlife generalist with experience in wildlife predator birds and rodents. Experience would also include a knowledge of the interrelationships between wildlife and livestock on open range and pasture, as well as experience in basic laboratory procedures.

In addition to the research activities in options I and II, the project would undertake the following activities.

1. Institutionalize research directed toward integrated approaches to vertebrate pest control within the wildlife section of ARC's proposed Natural Resources Division.
2. Integration would include cooperation with the Food Research Center, GOS agronomists and plant breeders to investigate resistant varieties and biological control techniques.
3. Assist ARC to establish a viable vertebrate pest research laboratory and other supporting facilities at Soba.
4. Initiate rodent damage and rodent baiting studies.
5. Evaluate rodenticides for application in Sudan.
6. Improve trapping/harvesting techniques for vertebrate pests and promote utilization as dietary protein supplement.
7. Initiate studies to determine residue levels for analysis of chemicals being used for direct and indirect control of vertebrate pests. The objective of the studies would be to determine if levels used pose a hazard to food consumed by humans and the effects on wildlife.
8. Establish network for disseminating research results and recommendations; and institutionalize a channel of technical support to government agencies responsible for extending and/or carrying out control activities.
9. Investigate game populations in selected areas to determine the toll of indirect control methods on secondary predators.
10. Support Sudan wildlife research of fragile habitats and potentially endangered species to facilitate a sustained yield harvest as a source of protein supplement.
11. Develop wildlife game management plan for harvesting to ensure viable populations that would allow sustained yields of animals as a food source for local population.

12. Intensive efforts will be directed to working with participants trained in wildlife management to assist them in preparing research plans and designing studies.
13. Towards end of project a national workshop stressing integrated pest and wildlife management techniques would be held within the Sudan.
14. Project would provide basic laboratory and field equipment necessary to conduct vertebrate pest and wildlife research studies.

BUDGET

<u>Technical Services</u>	<u>\$</u>	<u>LS.</u>
Long-Term (FC 10) 36 mo.	186,000	
Long-Term (FC 11) 36 mo.	220,000	
Short-Term	15,000	
<u>DWRC backstopping</u>	78,000	
 <u>Training</u>		
Long-Term (36 mo.)	51,000	
 <u>Commodities</u>		
2 vehicles	30,000	
1 UNIMOG/spares (waiver required)	45,000	
Equipment, chemicals, office/lab supplies	70,000	
 <u>Other Costs</u>		
Housing/Utilities		120,000
Operating Expenses/Reg. Travel		150,000
R/R		2,500
S-T Consultants per diem		13,500
3 Graduate Research Ass'ts	63,000	12,000
 <u>Construction (at Soba)</u>		
2 staff houses, lab/offices		100,000
Contingency/Inflation	<u>50,000</u>	<u>60,000</u>
Sub-Total	818,000	458,000
25% overhead	<u>204,500</u>	
Total	1,022,500	<u>458,000</u>

SUMMARY OF  
ADDITIONAL FUNDING REQUIREMENTS

<u>OPTIONS</u>	Funding (.000)	
	<u>US. DOLLARS</u>	<u>L.S.</u>
1. Terminate May, 1981	18.0	20.0
2. Project Extension 5/81 - 5/84	596.3	162.7
3. Project expansion, 5/81 - 5/84	<u>426.2</u>	<u>295.3</u>
Total	\$1040.5	LS 478.0

LOGICAL FRAMEWORK

From FY 77 to FY 81  
 Total US Funding \$592,000  
 Date Prepared: 02/18/80

Project Title & Number: Control of Vertebrate Pests, 931-0473

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project aims to contribute:</p> <p>To increase the available human food supply in East Africa, specifically in the Sudan.</p> <p>Sub-Goal: Decrease in crop losses from vertebrate pests in traditional and pseudo modern sectors.</p>	<p>Measures of Goal Achievement:</p> <ol style="list-style-type: none"> <li>1. Increased crop production yields.</li> <li>2. Use of cost-effective technologies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ministry of Agriculture statistics on crop production.</li> <li>2. Economic development reports.</li> </ol>	<p>Assumptions for achieving goal targets:</p> <ol style="list-style-type: none"> <li>1. New control technology appropriate to needs of country.</li> <li>2. GOS supports development strategy.</li> <li>3. Traditional &amp; modern farmers will benefit from vertebrate pest program.</li> </ol>
<p>Project Purpose:</p> <p>Develop safe, effective, and economic control techniques that can be used on both small traditional and modern farms to reduce crop losses caused by birds and rodents.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status:</p> <ol style="list-style-type: none"> <li>1. Damage assessment methodology improved.</li> <li>2. ARC in cooperation with all PP agencies systematically monitoring vertebrate pest problems annually.</li> <li>3. ARC in cooperation with all PP agencies monitoring newly developed ongoing control programs annually.</li> <li>4. Research results &amp; recommendations published by ARC &amp; available to user.</li> </ol>	<ol style="list-style-type: none"> <li>1. Pre-project survey &amp; monitoring reports.</li> <li>2. Reports of field &amp; laboratory research.</li> <li>3. In-country GOS reports.</li> </ol>	<p>Assumptions for achieving purpose:</p> <ol style="list-style-type: none"> <li>1. Field tests will show that vertebrate pest control techniques are economically and socially acceptable.</li> <li>2. Trained personnel are available.</li> <li>3. GOS strategy includes crop protection components with institutional base.</li> </ol>
<p>Outputs:</p> <ol style="list-style-type: none"> <li>1. Survey of population &amp; movements of quails &amp; other important species.</li> <li>2. Damage assessment techniques developed in cooperation with Min/Ag Statistics Dept.</li> <li>3. Chemical control methods evaluated.</li> <li>4. Vertebrate pest control research institutionalized in ARC.</li> <li>5. Coordination with organizations conducting scientific research on vertebrate pests.</li> <li>6. Damage Assessment of food losses due to bird and rodent activity in Sudan.</li> </ol>	<p>Magnitude of Outputs:</p> <ol style="list-style-type: none"> <li>1. Survey report for Sudan by 5/81.</li> <li>2. Damage assessment techniques improved.</li> <li>3. Two or more control chemicals evaluated for economic feasibility.</li> <li>4. Vertebrate pest control research staff trained and in place within ARC with cooperative linkages at other research sites in Sudan.</li> <li>5. Periodic exchange of information with FAO, GIZ and other regional/national agencies.</li> <li>6. First approximation of crop damage by the quails 5/81.</li> </ol>	<ol style="list-style-type: none"> <li>1. Publication of survey reports.</li> <li>2. Technical reviews by ARC &amp; AID.</li> <li>3. Technical review by ARC &amp; AID.</li> <li>4. ARC's organizational plan, budget, staffing pattern; work plans &amp; observation of facilities &amp; personnel.</li> <li>5. FAO, GIZ, regional/national agencies participation in seminars, evaluations, etc.</li> </ol>	<p>Assumptions for achieving outputs:</p> <ol style="list-style-type: none"> <li>1. Both GOS &amp; USAID will provide additional support as needed.</li> <li>2. DMRC TDY back-up research &amp; administrative support provided on timely basis.</li> <li>3. GOS will make available adequate and suitable personnel for training and operational research support.</li> <li>4. AID inputs provided in a timely manner.</li> </ol>
<p>Inputs:</p> <p>AID</p> <ol style="list-style-type: none"> <li>1. PERSONNEL             <ul style="list-style-type: none"> <li>48 PM L-1 Biologist</li> <li>10 PM consultants</li> <li>6.5 PM DMRC coordinator</li> <li>53 PM DMRC Research Support</li> <li>18 PM Secretary (local hire)</li> <li>13 PM Driver</li> </ul> </li> <li>2. Training (participant &amp; in-country)</li> <li>3. PI 40% local currency</li> </ol> <p>GOS</p> <ol style="list-style-type: none"> <li>1. Personnel</li> <li>2. Facilities</li> <li>3. Equipment</li> <li>4. Field sites</li> </ol>	<p>Implementation Target (Type &amp; Quant)</p> <p>\$374,334          May 1977 - May 1981          Jan. 1980 - June 1981</p> <p>\$68,000: 2 U.S. MSc degrees          Sept. 1977 - Feb. 1980          \$100,000 equivalent (750 pts per \$1)</p> <p>5 PPD staff driver seconded to ARC 8/79.          office space          2 vehicles, safari equipment, aerial spraying          ARC Chamber Cooks, Med. Material</p>	<ol style="list-style-type: none"> <li>1. Observation, PASA agreements, USAID and DMRC records.</li> <li>2. Observation and OSB records.</li> <li>3. Observation and project records.</li> <li>4. Observation, USAID and project records.</li> </ol>	<p>Assumptions for providing inputs:</p> <ol style="list-style-type: none"> <li>1. Personnel available.</li> <li>2. Funds allotted</li> </ol> <p>GOS</p> <p>Country commitments finalized (manpower, facilities, equipment, field sites).</p> <p>* Para-statal organization such as Co-ops</p>