

PURDUE UNIVERSITY
International Education and Research
International Programs in Agriculture



**PORTUGAL UNIVERSITY
INSTITUTES
DEVELOPMENT PROJECT**

(Contract AID/NE-C-1701)

**REPORT ON
SHORT-TERM STAFF ASSIGNMENT**

Submitted by
DR. MICHAEL COLLINS
University of Wisconsin
Madison, Wisconsin

July 17 - August 7, 1982

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PORTUGAL UNIVERSITY INSTITUTES DEVELOPMENT PROJECT

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REPORT ON
SHORT-TERM STAFF ASSIGNMENT

at the

Instituto Universitario de Tras-os-Montes e Alto Douro
Vila Real, Portugal

JULY 17 - AUGUST 7, 1982

Submitted by

DR. MICHAEL COLLINS
Department of Agronomy
University of Wisconsin
Madison, Wisconsin

PORTUGAL UNIVERSITY INSTITUTES DEVELOPMENT PROJECT

Report on Short-term Staff Assignment
Submitted by
Dr. Michael Collins
University of Wisconsin

A large portion of this three week visit was used in becoming more familiar with the types of forage and animal production systems in current use in northern Portugal. Forage production problems were discussed with University personnel as well as research programs underway to meet regional needs.

Overall, I was favorably impressed that the type of research I observed was designed to gain information which will directly benefit agriculture in the region. This is the type of research needed if major changes in the agricultural system are to be made. Campus laboratory facilities for forage quality research are adequate to conduct most of the analyses currently used in general quality evaluation. In addition, the level of cooperation between researchers appears to be very good in most cases.

It appeared that some University faculty lacked a clear sense of direction in identifying research areas for Ph.D. research and in initiating and conducting these research programs. This is almost certainly due in part to the relatively small number of Ph.D. faculty to serve as advisors and mentors for the large number of Ph.D. candidates at Vila Real. In instances in which no research advisor is available in Portugal for a candidate in a specific research area,

each person should be encouraged to visit and develop a cooperative relationship with a scientist in the same research area outside the country.

In addition, a mechanism to review and evaluate each proposal for research would be helpful. As part of the review process, the scientific merits of the proposed research should be judged and the proposed procedures for conducting the research should be evaluated. Such a review process would help to insure that each proposal for research is well planned. It would also provide an opportunity for positive criticism and suggestions to be offered to improve the research proposal. The process of preparing a detailed research plan is helpful to the researcher in organizing his or her thoughts, especially regarding the procedures to be used in conducting the study.

Area of Assignment

Forage management and quality.

Specific Objectives

To support A. M. Ferreira in field and laboratory experiments concerning corn silage. To advise other staff members working on forage production and utilization.

Portuguese Counterparts

Armando Mascarenhas Ferreira

Evaluation of the Corn Forage Research Program

Corn evaluation experiments currently under way in field plots and experiments conducted during 1979, 1980, and 1982 were discussed.

Treatments for each trial were discussed and available data reviewed.

In 1979, two varieties of corn were chosen to represent an early and a medium type. Plots of each variety were harvested at 50 cm shoot height, heading, silking, milk, dough, and hard dough maturity stages. Samples collected at each harvest were separated into leaf, stem, and ear components for yield and quality determination.

This experiment will provide needed information on changes in yield and composition of corn forage with advancing maturity. Samples of the whole plant and each component will be analyzed for total N, in vitro dry matter disappearance (IVDMD), natural detergent fiber (NDF), acid detergent fiber (ADF) and lignin (ADL). In addition, each whole plant sample will be analyzed for P, K, Ca, Mg, Zn, Cu and Mn.

In 1980, three varieties were evaluated when seeded at 10, 15, 20, 25 and 30 plants/M². The objective of this study was to determine whether the optimum plant population differs for varieties differing in maturity. Similar studies were conducted during 1981 and 1982.

Forage quality analysis will continue during autumn of 1982 and spring of 1983 on samples collected during 1982 and in previous years. In addition to the analyses already outlined for each sample, tissue from the 1979 and 1981 trials will be analyzed for starch and total sugars concentration at the University of Wisconsin.

Progress toward completion of the objectives of the corn research program is excellent and data collection should be completed by late

spring of 1983. Statistical analysis of the data will be conducted during 1983 as part of a proposed 2 month visit by Mr. Ferreira to the University of Wisconsin during April and May.

Additional Forage Research Needed

As a result of discussions during the past three weeks, two studies were planned to gain additional information on forage yield and quality. The first study is designed to evaluate the potential of rye to furnish forage during winter or spring without seriously reducing the yield of grain and straw. The treatments will involve harvests at the four or six leaf stage during early development followed by no second harvest or a harvest after 15 cm of regrowth. The control will consist of rye not harvested prior to grain harvest. Plots will receive either no N or 40 kg/ha of N at seeding. At harvest data will be collected on forage yield and quality. At maturity grain yield and straw yield will be measured for each treatment.

A second study was designed to evaluate the potential of sorghums for forage production in this region. Two varieties each of sudan-grass, sorghum x sudangrass hybrid and forage sorghum will be grown with and without irrigation. Sorghum forage will be harvested when the shoots reach 75 cm height. A single treatment of corn will be included for comparison. Corn will be harvested at the hard dough stage.

All forage samples from both experiments will be analyzed for total N, IVDMD, NDF, ADF, and ADL.

General Observations

The quality of grass hay harvested during late July and August in this region appears to be very low. The quality of the forage harvested, and the productive value of the hay produced would be increased considerably by earlier harvesting. Harvesting at an earlier maturity would reduce yield somewhat; however, the quantity of digestible nutrients harvested per hectare would not be reduced. In fact, the potential for animal production per unit area would increase due to the higher digestibility and higher consumption per animal. A higher energy level in the forage would reduce the need for concentrate energy supplements. Hay harvested at an earlier maturity would be higher in protein concentration and higher in several important minerals.

Apparently, a strong consideration in the delayed harvest is to avoid the possibility for rain during the harvesting process. Research conducted with grass hay in northern Europe indicated that the reduction in grass hay yield and quality due to rain during curing is small; considerably smaller than the reduction in quality due to delayed harvest.

In order to be successful in improving the overall forage-animal production system, several factors must be considered simultaneously. Among these factors are soil pH and fertility, forage species and management and storage, animal breed and management, marketing system for animal products and others. Changing one component of the system without considering others may not result in any overall improvement.

One factor that should be considered in long-term planning for research is the problem of providing adequate land for forage and grain

production for animal feeding and plot research. It is likely that land for these purposes will be needed at some point in the future. As the size of the campus increases, the demand for additional space may necessitate the transfer of some research activities to another location.