PORTUGAL UNIVERSITY INSTITUTES DEVELOPMENT PROJECT
(Contract AID/NE-C-1701)

REPORT ON

SHORT-TERM STAFF ASSIGNMENT

AT THE

INSTITUTO UNIVERSITARIO DE TRAS-OS-MONTES E ALTO DOURO

VILA REAL, PORTUGAL

September 15 - November 15, 1983

Submitted by

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PORTUGAL UNIVERSITY INSTITUTES DEVELOPMENT PROJECT

Report on Short-term Staff Assignment

Areas of consultancy:

Extension, teaching and research areas of agricultural structures including structural design, ventilation and feed and waste handling.

Specific objectives of the consultancy:

To assist IUTAD in determining how their teaching, research and extension program might function in the solution of the agricultural structures and equipment machinery problems. To evaluate the methods by which the information can be best transferred to the agricultural community.

Identification of Portuguese counterparts:

Engº - Antonio Machado, IUTAD

Accomplishments with respect to objectives of the assignment:

Extension Area: As the result of farm tours in the zone of IUTAD, it was determined that ventilation of dairy and other cattle housing structures was a serious problem. In addition, feed handling and animal housing systems could be improved in the area of labor saving techniques. It was also determined that the need and expense of installing mechanical ventilation fans and other mechanical devices were not required to improve the animal housing systems.

A plan to develop a series of short extension publications that dealt with solving the ventilation and housing system problems was implemented. These extension publications were to be short, deal with one problem and/or answer one question.

Published was the first IUTAD publication in the extension area entitled, ER-351, "Natural Ventilation for Gable Roofed Dairy Buildings." A photo copy reduction is included in this report as Appendix B. The publication series was to be low cost, single page if possible and quick to produce. It was intended to be simple reading and easy to distribute.

Other publications in this series are in various stages of development, from rough draft to a detailed subject matter outline including illustrations and plans, ready for translation into Portuguese. The titles of this series are as follows:

Ventilation of Basement Dairy Stables
Cubicle Housing for Dairy
Constructing Cubicles
Constructing Feed Bunks for Outside Feeding
Remodeling Basement Stables for Dairy
Portable Cubicle Housing Plan for Cow-calf
Portable Cubicle Housing Plan for Dairy

The concept for the development of this publication series was to limit the subject to answering one question or the discussion of one new idea. This procedure simplified the writing, reduced the printing costs and was intended to build the confidence of the IUTAD staff so that they were willing to write extension publications. Because the subject content of the publications is so limited, a sequal series of publications could be written for many livestock species using the same housing system or ventilation method. In time the publications will become longer and more complex.

A seminar was presented to the IUTAD staff entitled, "Extension Publications and other Techniques." It attempted to illustrate the U.S. Extension system and its cooperation with the University system. Detailed was the roles of extension specialist and county agent. The techniques and concepts of extension publication writing was discussed, as well as other extension methods of technical workshops, tours and problem solving consultations.

Research Area: Almost nothing was accomplished in establishing a agricultural structures research program except to determine that a need for a program existed. The conflict between two consultant programs for the time of the Portuguese counterpart, A. Machado, coupled with his responsibilities for teaching and examinations left little time to accomplish this phase of the project. There is need for a research program that will improve agricultural structures in Portugal.

Time was allotted for consulting with other staff of IUTAD concerning the structure problems connected with animal science research projects. Plans were sketched for a shed to house cattle and a box stall plan was developed for a stallion. Also, recommendations were made to improve the natural ventilation system in a IUTAD sheep and goat research unit. No results of actions taken on these projects is available.

Teaching: The subject matter content of the agricultural structures course was excellent. It dealt primarily with the environmental and planning phases of buildings. Discussions about a second structures course which would include materials and construction were held, but no results were accomplished.

Two lectures comparing U.S. and Portuguese agricultural structures were presented to the students. They pointed out the similarities and differences between the two concerning materials of construction, size of operation and the use of material handling and labor saving equipment.

Identification and analysis of problems encountered:

Two problems were encountered on this assignment. The first was a language communication problem. Publications written in English do not translate in organization and effectiveness into Portuguese.

The solution to the problem was to outline in detail the subject matter and organization of the publication in English, working closely with the Portuguese counterpart. Upon completion of the publication outline, write it in Portuguese.

The second problem was the result of inavertent scheduling of two independently sponsored projects for one cooperator in an overlapping time period. There was no solution but to give up as much time as required for the 2 week project dealing with transportation and storage of potatoes. The extension publication work continued, but without completion of detailed outlines readied for translation. The research and teaching portion of the project was not completed.

There is a need administratively to recgonize that extension publications do take time for development and writing. A need that can only be met by reducing the workload of teaching and research an appropriate amount.

Future requirements and proposed action

The teaching and research portion of this program are not complete, as is a portion of the planned extension publications. In order to complete this project a return trip to Portugal is in order.

Itinerary of W. H. Friday
September 15 - November 15, 1983

15/9 - Travel to Portugal
16/9 - Visit AID/Lisboa
17/9 - Travel to Vila Real
19/9 - Tour UTAD Facilities
20/9 - Tour Farms Vila Pouca Area
21/9 - Tour Farms Chaves Area
22/9 - Tour Farms Famalicao Area
25/9 - Tour Farms Famalicao Area
26/9 - Office - dairy plans - Barros farm
27/9 - Office - horse stalls
Travel Barros farm, Chaves
28/9 - Office - Natural ventilation publication
29/9 - Office - Natural ventilation publication
30/9 - Tour farms Mirandela area
3/10 - Travel Maranda do Douro area
4/10 - Travel Maranda do Douro area
5/10 - holiday
- Travel to Castelo Branco
6/10 - Tour facilities Institute Castelo Branco
7/10 - set building location at Institute, Castelo Branco
- Travel to Vila Real
10/10 - Office - publications
Vila Real - meeting w/ Extension Service
11/10 - Office - Publication - ventilation
12/10 - Office - Publication - ventilation
13/10 - Office - Publication - freestalls
14/10 - Office - Publication - freestalls
17/10 - Office - Publications
18/10 - Office - Publications
19/10 - Office - Publications
20/10 - Office - Publications/1st printing ventilation
21/10 - Travel - Extension Service Morgadouro
24/10 - Office - Publication/consult animal science
25/10 - Office - Publication/consult vets.
26/10 - Office - Publication/consult Seveno
27/10 - Office - Publication
28/10 - Office - Publication
31/10 - Office - Research
1/11 - Holiday
2/11 - Office - Teaching Prep
3/11 - Office - Class/travel to Lisboa
4/11 - Lisboa - Meeting with AID
6/11 - Travel to Vila Real
7/11 - Office - Seminar preparation
8/11 - Office - Teaching class preparation
9/11 - Office - Class/Seminar preparation
10/11 - Office - Seminar Extension Methods

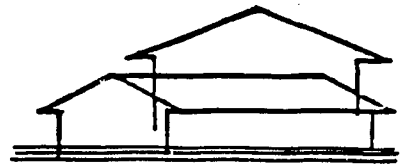
11/11 - Office - Teaching evaluation
14/11 - Office - Report
15/11 - departure to Madrid, etc. & 1/12 return to U.S.

APPENDIX B

IUTAD Extension Publication

"Natural Ventilation for Gable Roofed Dairy Buildings"

IUTAD
INSTITUTO UNIVERSITÁRIO DE TRÁS-OS-MONTES E ALTO DOURO
VILA REAL - PORTUGAL



ER 351

Série Extensão
CONSTRUÇÕES RURAIS E CONDICIONAMENTO

VENTILAÇÃO NATURAL EM EDIFÍCIOS COM DUAS ÁGUAS - VACARIAS

*A. Machado * e W. H. Friday ***

PORQUÊ VENTILAR

Todos os animais produzem em maior ou menor quantidade calor e vapor de água que fornecem ao ambiente que os rodeia.

Se o calor e o vapor de água produzidos, bem como os cheiros desagradáveis, não forem removidos cria-se no interior do edifício um ambiente viciado prejudicial para os animais.

Essa remoção é conseguida introduzindo no edifício ar fresco que vai substituir o ar viciado existente, isto é, ventilando.

EFEITOS DA VENTILAÇÃO

INVERNO: Ao removermos o vapor de água produzido pelos animais evitamos:

- A sua condensação na cobertura que pode mesmo ser acompanhada da queda de gotas de água.
- Que se crie um ambiente favorável ao desenvolvimento e transmissão de doenças.
- Que os animais suportem condições ambientais muito diferentes dos valores desejados.

VERÃO: Ao removermos calor do interior do edifício conseguimos:

- Baixar a temperatura do estábulo criando condições mais favoráveis aos animais
- Que os animais permaneçam mais tempo na área de repouso (coberta) quando se trata de uma estabulação livre.
- Melhorar as condições de trabalho do tratador.

COMO VENTILAR

A forma mais fácil e económica de ventilar é deixar que a natureza o faça - ventilação natural.

Este sistema de ventilação funciona como consequência da acção de um ou mais dos seguintes factores, ilustrados na fig. 1:

Fig. 1 Funcionamento de um sistema de ventilação natural

- Pressão do vento sobre aberturas existentes nas paredes e cobertura.
- Diferenças de temperatura. O ar quente sobe e sai pelas aberturas existentes na cobertura - cumeeira ou chaminés.
- Movimento natural, no sentido ascendente, do ar quente e húmido.

Durante o Verão a semelhança que existe entre as temperaturas interior e exterior inibe o efeito da diferença de temperatura, obrigando à existência de aberturas de grandes dimensões nas paredes para que a pressão do vento provoque a entrada de ar fresco no edifício.

Durante o Inverno a circulação do ar é provocada pelas diferenças de temperatura que se registam entre o interior e o exterior do edifício e pela pressão do vento nas paredes e cobertura.

Quando não há vento a movimentação natural do ar quente e húmido faz com que o sistema funcione.

* Assistente de Construções Rurais no IUTAD e ** Professor Associado de Construções Rurais na Universidade de Purdue.

DIMENSIONAMENTO DAS ABERTURAS

FRESTA DE CUMEEIRA: Abrir a cumeeira (Fig. 2) com uma área igual à indicada no Quadro I. Se os animais estiverem alojados no edifício durante o Inverno e Verão deve utilizar-se a área recomendada para esta última situação.

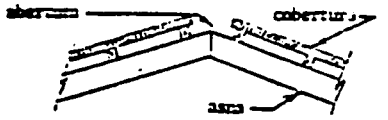


Fig. 2 Abertura da cumeeira

QUADRO I - Área de abertura da cumeeira

	INVERNO	VERÃO
vitelos	30 cm^2	0,09 m^2
adultos	90 "	0,27 "

Para que seja reduzida a entrada de água da chuva ou neve, pode utilizar-se uma das soluções apresentadas na Fig. 3. A cumeeira sobreelevada reduz a saída do ar e por isso a superfície da abertura deve ser superior em 50% ao valor indicado no Quadro I.

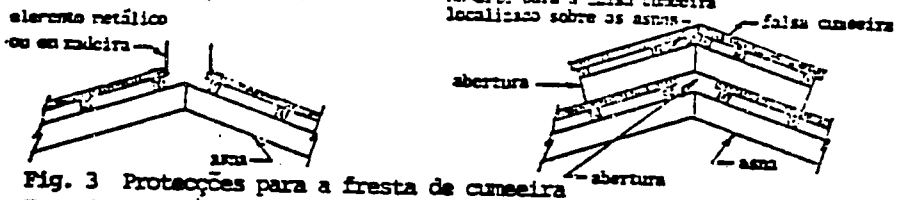


Fig. 3 Protecções para a fresta de cumeeira

Estando o sistema dependente das condições exteriores de temperatura e velocidade do vento, só podemos obter os valores desejados de renovação do ar se o sistema for regulável. Na fig. 4 são apresentadas duas soluções que permitem fazê-lo.

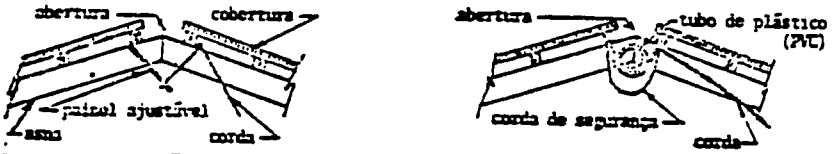


Fig. 4 Regulação da superfície para a saída do ar

PAREDES LATERAIS: Em ambas as paredes laterais devem existir aberturas para entrada do ar com uma área igual à da abertura da cumeeira. A fig. 5 mostra diferentes tipos de aberturas que devem estar localizadas na parte superior da parede para que se evitem as correntes de ar sobre os animais durante o Inverno.

Para que se obtenha uma melhor distribuição do ar no edifício as aberturas devem ser contínuas ao longo da parede. As aberturas reguláveis permitem um melhor controlo em função das variações das condições climáticas exteriores.

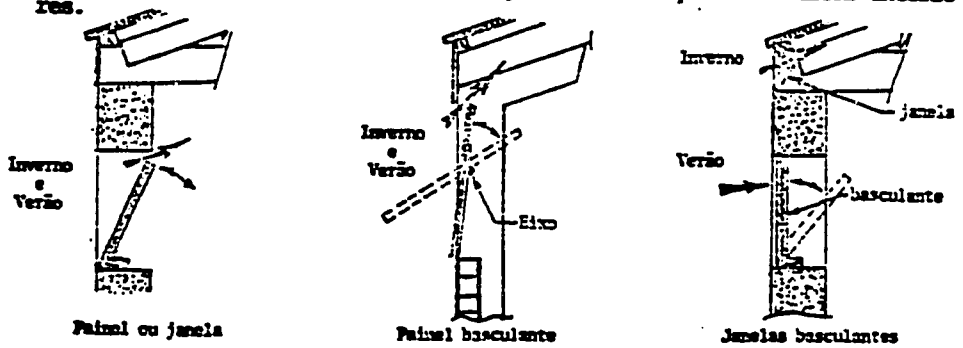


Fig. 5 Diferentes tipos de aberturas nas paredes laterais

SUMÁRIO

- Todos os edifícios destinados ao alojamento de animais necessitam de ventilação.
- A forma mais económica de o fazer é naturalmente - ventilação natural.
- Se o sistema for regulável podemos ajustá-lo em função das condições exteriores de temperatura e velocidade do vento e obter melhores resultados.

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