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AN ECOLOGICAL STUDY

OF THE

DUNG PATCH

ON

DAIRY PASTURES

by

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TABLE OF CONTENTS

	Page
INTRODUCTION	1
CHAPTER ONE - REVIEW OF LITERATURE	3
Faecal production and Distribution	3
Area of Pasture Affected by Dung Patches	6
Effect of Patch on Grazing Behaviour and Utilisation	7
Factors affecting Rate of Decay of Dung Patch	12
Nutrient Content of Dung Patch	15
Effect of Nutrients from Dung Patch on Surrounding Herbage	18
Significance of Excretal Return to Grassland Production	19
CHAPTER TWO - A PRELIMINARY INVESTIGATION (with 6 Text Figures)	26
Experimental	26
Results and Discussion	28
CHAPTER THREE - ECOLOGICAL EXPERIMENT I (With 9 Text Figures)	35
Experimental	35
Analysis of Data	43
Results	47
Discussion	63
CHAPTER FOUR - ANIMAL BEHAVIOUR STUDY (with 3 Text Figures)	67
Experimental	67
Blinker Design	69
Method of Analysis	72
Results	74
Discussion	77

TABLE OF CONTENTS - Cont'd

	Page
CHAPTER FIVE - ECOLOGICAL EXPERIMENT II (with 4 Text Figures)	80
Experimental	80
Analysis of Results	84
Results	86
Discussion	93
CHAPTER SIX - RELEASE OF AMMONIA FROM A DUNG PATCH (with 1 Text Figures)	96
Materials and Method	96
Results	100
Conclusions	103
CHAPTER SEVEN - GENERAL DISCUSSION (with 1 Text Figures)	105
Conclusion	122
SUMMARY	123
BIBLIOGRAPHY	125
APPENDIX	
<u>LIST OF PLATES</u>	After Page
Plate 1 Six Photos showing Layout and Method of Sampling in Experiment I	38
Plate 2 Five Photos showing Dung and Artificial Patch in situ and Sites for Soil Samples and Herbage Cores	39
Fig 4.1 Three Photos showing Blinker Design	71
Plate 3 Six Photos showing Layout and Applic- ation of Cutting Treatments in Experiment II	83
Plate 4 Two Photos showing Apparatus for collection of Ammonia from Dung Patch	98

INTRODUCTION

The fertility cycle is an inherent feature of pasture production. The animal grazes the pasture, retains the digestible energy and small amounts of the plant nutrients it requires and returns the remainder to the sward as excreta. The pasture may then use the nutrients in the excreta for further growth.

In countries such as New Zealand where the animals graze the pasture all the year round the fertility cycle remains intact. The animals excreta is deposited as discrete dung and urine patches on virtually the same pasture from which it was derived, where it is immediately subjected to an environment responsible for its decay and incorporation into the soil.

This fertility cycle is broken, however, in countries where the animal is fed indoors for part of the year. Under this system of management, the excreta becomes mixed with the bedding material of the stalls in which the animals are housed. The mixture, commonly termed "farmyard manure", is eventually redistributed back onto the pasture or mixed with the soil as a manure for crops. Also while in the stalls, the animals are fed meal and conserved fodder which may not necessarily have been grown on land to which the "farmyard manure" is returned. Consequently, although many experiments have been conducted overseas with "farmyard manure", the results have very little relevance to the situation as it exists in New Zealand.

Literature which is relevant to the New Zealand situation is limited to a number of "return" experiments conducted with sheep. For example, Sears (1951) found that returning excreta to a pasture increased yields by up to 40%. He estimated that the manurial value of the excreta returned in these experiments was the equivalent of approximately 24 cwt of Sulphate of Ammonia, 18 cwt of 30 per cent Potash, 6 cwt of Superphosphate and 3 cwt of Carbonate of Lime (Sears 1951).

Although the nutrient content of cattle excreta is recognised (Davies

et al 1962) no equivalent return experiments with cattle have been attempted, probably because experiments of this type would be large, costly and time-consuming. Instead, research workers have relied on detailed ecological studies of excretal patches to estimate the manurial value of cattle excreta, and from these have extrapolated to the field situation. Literature on the cattle urine patch is well documented in this respect (During and McNaught 1961, Lotero et al 1965, 1966, Dale 1961, Davies et al 1962). Analagous experiments with dung patches are, however, more limited being confined to the comprehensive study by Norman and Green (1958), the largely theoretical consideration of Petersen et al (1956 I,II) and the limited observations made by several authors during grazing experiments (McLusky 1960, Tayler and Large 1955).

The aim of the experiments presented in this thesis was to attempt to provide further empirical data helpful in determining the ecological significance of the dung patch. A preliminary investigation was made of the distribution and persistence of the dung patch in the field. This was followed by several experiments investigating aspects which arose from observations made during the field study. These included

1. A detailed ecological study on the effect of a dung patch on the soil and surrounding herbage
2. A similar study to the first but including a defoliation treatment to simulate the grazing situation
3. A study of the importance of sight and smell as aids to the animals' selection of herbage in the presence of dung patches

A chapter is devoted to each experiment and includes the aim of the experiment, the methods employed and the results obtained. The results are discussed within the context of the experiment at the end of each chapter. A general discussion in the final chapter attempts to integrate the findings of each experiment and relate them to the field situation.