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**A STUDY OF GRASS SILAGE PRESERVATION WITH
PARTICULAR REFERENCE TO THE USE OF
SODIUM METABISULPHITE
AS AN ADDITIVE**

**A Thesis Presented in Partial Fulfilment of
the Requirements for the Degree of
Master of Agricultural Science
in the University of New Zealand.**

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TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
I INTRODUCTION	1
II REVIEW OF LITERATURE	4
<u>A. THE ENSILAGE PROCESS.</u>	4
1. Definition of the Product	4
2. Changes within the Container.	5
(a) Physiological Changes	5
(b) Microbiological Changes	7
3. Ensiling Problems Associated with Immature Herbage	10
<u>B. NUTRIENT LOSSES IN SILAGE-MAKING BY THE ORDINARY PROCESS.</u>	13
1. The Nature of Nutrient Losses	13
2. The Measurement of Nutrient Losses.	13
3. The Magnitude of Nutrient Losses.	16
(a) Total Losses.	16
(b) Drainage Losses	20
(c) Spoilage Losses	22
(d) Fermentation Losses	23
<u>C. THE USE OF ADDITIVES IN SILAGE-MAKING</u>	25
1. Definition and Classification of Additives.	25
2. Additives and their effect upon Nutrient Losses	25
(a) Direct Acidification.	25
(b) Stimulation of Lactic Fermentation.	31
(c) Sterilization of the Mass	37
3. The Digestibility and Palatability of Additive Treated Silage	50
(a) Digestibility	50
(b) Palatability.	54

<u>CHAPTER</u>	<u>PAGE</u>
III PRELIMINARY INVESTIGATIONS INTO THE USE OF SODIUM METABISULPHITE AS AN ADDITIVE IN SILAGE-MAKING.	60
<u>A. THE CHEMICAL COMPOSITION OF THE SILAGES</u>	61
Experimental Procedure.	61
Experimental Results.	64
<u>B. THE RELATIVE PALATABILITY OF THE SILAGES.</u>	75
Experimental Materials.	75
Experimental Methods.	76
Experimental Results.	81
Trial 1.	81
Trial 2.	93
Trial 3.	96
<u>C. THE DIGESTIBILITY OF THE SILAGES.</u>	102
Experimental Procedure.	102
Experimental Results.	105
<u>D. DISCUSSION OF PRELIMINARY RESULTS</u>	111
<u>E. SUMMARY OF PRELIMINARY RESULTS.</u>	120
IV FURTHER STUDIES IN THE USE OF SODIUM METABISULPHITE AS AN ADDITIVE IN SILAGE-MAKING	122
<u>A. THE NUTRIENT LOSSES AND CHEMICAL COMPOSITION OF THE SILAGES.</u>	122
Experimental Materials.	123
Experimental Methods.	123
Experimental Results.	132

CHAPTER

PAGE

IV contd.

<u>B. THE NUTRITIVE VALUE OF THE SILAGES</u>	152
(a) Digestibility of the Silages	152
Experimental Procedure	152
Experimental Results	153
(b) Relative Palatability of the Silages	160
Experimental Procedure	160
Experimental Results	161
<u>C. DISCUSSION OF RESULTS.</u>	165
<u>D. SUMMARY OF RESULTS</u>	175

V <u>FINAL SUMMARY AND CONCLUSIONS</u>	177
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<u>REFERENCES.</u>	181
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ACKNOWLEDGEMENTS.

APPENDICES.



LIST OF TABLES

<u>TABLE</u>		<u>PAGE</u>
I	Losses of Dry Matter obtained by the Bag Method and by Weighing the Total Contents of the Silo. . . .	15
II	Summary of Data in the Literature for Dry Matter Losses in the Ensilage of Grass-legume Mixtures by the Ordinary Process.	16
III	Percentage Losses of Dry Matter in Ordinary and A.I.V. Silages.	27
IV	Average Nutrient Losses in Grass Silage during Storage.	33
V	Summary of Data in the Literature for Losses in Grass Silage Treated with Sodium Metabisulphite as compared with Other Processes.	42
VI	Mean Treatment, Depth and Block Values of the Dry Matter Content and pH of the Silages.	66
VII	Analysis of Variance of the Mean Dry Matter and pH Values of the Silages.	67
VIII	Mean Treatment, Depth and Block Values of the Carotene Content of the Silages.	69
IX	Analysis of Variance of the Mean Carotene Values of the Silages.	69
X	Mean Depth and Block Values of the Residual Sulphite Concentration of the Treated Silage.	70
XI	Analysis of Variance of Residual Sulphite Concentration of Treated Silage.	71
XII	Mean Organic Acid Content of the Silages.	71
XIII	Analysis of Variance of Mean Butyric and Acetic Acid Contents of the Silages.	72
XIV	Relationship between the pH Value, Total Volatile Acidity and Lactic Acid Content of the Silages. . . .	73
XV	Correlation Coefficients as Determined for Various Constituents in the Silages.	74
XVI	Grouping of the Experimental Animals and Allocation of Treatments.	77
XVII	Total Feed and Dry Matter Consumption and Changes in Liveweight of 8 Sheep fed Untreated Silage over a 7-day Initial Experimental Period.	83

TABLEPAGE

XVIII	Total Feed and Dry Matter Consumption and Changes in Liveweight of Two Groups, each of 4 Sheep, fed Untreated and Treated Silage respectively over a 10-day Experimental Period.	84
XIX	Analysis of Covariance and Test of Significance of the Adjusted Mean Silage Intakes of Sheep fed Untreated and Treated Silages.	85
XX	Analysis of Error Variance in Sheep Data.	86
XXI	Unadjusted and Adjusted Mean Silage Intakes over the Experimental Period.	87
XXII	Mean Dry Matter Content of the Feed Offered to and Refused by 8 Sheep fed Untreated Silage over a 7-day Initial Experimental Period.	88
XXIII	Mean Dry Matter Content of the Feed Offered to and Refused by 2 Groups, each of 4 Sheep, fed Untreated and Treated Silage respectively over a 10-day Experimental Period.	88
XXIV	Analysis of Covariance and Test of Significance of the Adjusted Mean Dry Matter Intakes of Sheep fed Untreated and Treated Silage.	90
XXV	Analysis of Error Variance in Sheep Data.	91
XXVI	Unadjusted and Adjusted Mean Dry Matter Intakes over the Experimental Period.	92
XXVII	Feed Intakes of Six Sheep given a Free Choice of Untreated and Treated Silages over a 7-day Period. . .	93
XXVIII	Mean Dry Matter Contents of the Feeds Offered to and Refused by Six Sheep given a Free Choice of Untreated and Treated Silages.	95
XXIX	Dry Matter Intakes of Six Sheep given a Free Choice of Untreated and Treated Silages over a 7-day Period..	96
XXX	Feed Intakes of Three Dry Cows given a Free Choice of Untreated and Treated Silages over a 7-day Period. . .	98
XXXI	Mean Dry Matter Content of the Feeds and Refuse of Three Dry Cows given a Free Choice of Untreated and Treated Silages.	99
XXXII	Dry Matter Intakes of Three Dry Cows given a Free Choice of Untreated and Treated Silages over a 7-day Period.	101
XXXIII	Chemical Analysis of Feeds, Refuse and Faeces.	106
XXXIV	Apparent Digestibility Coefficients of the Silages. . .	108
XXXV	Average Weight of each Sheep at the Beginning and End of the 10-day Collection Period.	109

<u>TABLE</u>	<u>PAGE</u>
XXXVI	Mean Values for the Total Digestible Nutrient Content, the Starch Equivalent, Digestible Crude Protein Content and Nutritive Ratio of the Silages. 110
XXXVII	Botanical Composition of the Experimental Pasture. 133
XXXVIII	Mean Chemical Composition of the Herbage Ensiled and Resultant Silages. 133
XXXIX	Mean Chemical Composition of the Exudates. 135
XL	Weights of Fresh Material, Dry Matter, Crude Protein, Mineral Matter and Organic Matter Ensiled and Lost in Seepage from the Resultant Silages. 137
XLI	Actual and Percentage Losses of Metabisulphite in the Exudates from Treated Silages. 139
XLII	Total and Percentage Losses of Dry Matter, Crude Protein, Mineral Matter and Organic Matter from the Silages as Inedible Material. 141
XLIII	Total and Percentage Losses of Dry Matter, Crude Protein, Mineral Matter and Organic Matter due to Fermentation in the Silages. 142
XLIV	Actual and Percentage Total Losses of Dry Matter, Crude Protein, Mineral Matter and Organic Matter from the Silages. 144
XLV	Exudate, Spoilage, Fermentation and Total Losses of Dry Matter, Crude Protein, Mineral Matter and Organic Matter from the Silages. 145
XLVI	Mean Temperatures in the Silages. 146
XLVII	Mean Treatment and Depth Values of the pH, Volatile Organic Acid and Carotene Content of the Silages. 148
XLVIII	Analysis of Variance of Mean pH, Volatile Organic Acid and Carotene Values of the Silages. 148
XLIX	Chemical Analysis of Feeds, Refuse and Faeces. 153
L	Mean Apparent Digestibility Coefficients of the Silages . 154
LI	Average Weight of Each Sheep at the Beginning and End of the 10-day Collection Period. 157
LII	Mean Values for the Total Digestible Nutrient Content, Starch Equivalent, Digestible Crude Protein Content and Nutritive Ratio of the Silages. 158
LIII	Preference of Dairy Cows for Silage made from Immature and More-mature Herbage, Untreated and Treated with Sodium Metabisulphite. 162

LIST OF FIGURES

<u>FIGURE</u>		<u>PAGE</u>
1	Sample of untreated grass silage (Sears, 1955).	44a
2	Sample of grass silage treated with sodium metabisulphite (Sears, 1955).	44a
3	Layout of randomized block design for sampling the untreated silage.	62a
3a	Scale diagram representing the top surface of the block design on the untreated silage and indicating the location of sample points.	62a
4	Layout of randomized block design for sampling the treated silage.	62b
4a	Scale diagram representing the top surface of the block design on the treated silage and indicating the location of sample points.	62b
5	Sample of untreated grass silage.	65a
6	Sample of metabisulphite-treated grass silage.	65a
7	Feeding box used in sheep trials.	76a
8	Weighing the experimental sheep.	76a
9	Sheep fitted with harness for the collection of faeces.	103a
10	The experimental silos.	123a
11	Interior view of experimental silo, showing central drain.	123b
12	Field harvesting of the herbage.	124a
13	Filling the silos with immature herbage.	124a
14	Filling the silos with more-mature herbage	125a
15	The experimental silos, roofed to prevent penetration of rain water.	125a
16	Tripod and spring balance used to record the weights of ensiled herbage	126a
17	Platform scales used to record the weights of ensiled herbage.	126a
18	Application of sodium metabisulphite	127a
19	Collection of exudate from one of the experimental silos.	127a

FIGURE

		<u>PAGE</u>
20	Close view of thermocouple lead.	128a
21	Recording the temperatures in the silages	128a
22	Removal of silage from experimental silo	129a
23	Tripod and spring balance used to record the weights of silage removed from the silos	129a
24	The flow of exudate from the immature silages during 26 days after completion of filling	134a
25	The flow of exudate from the more-mature silages during 26 days after completion of filling	134a
26	pH values of the exudate from the silages during 32 days after completion of filling	136a
27	The loss of metabisulphite in the exudate from treated silages	138a
28	Daily temperature changes in the silages for 32 days after completion of filling.	146a
29	Sample of untreated immature grass silage.	148a
30	Sample of metabisulphite-treated immature grass silage	148a
31	Sample of untreated more-mature grass silage	148b
32	Sample of metabisulphite-treated more-mature grass silage	148b
33	Layout of feeding bins in concrete yard for palatability tests	160a
34	The admission of the cows to the yard to test their preference of the silages.	160b
35	The experimental cows on the palatability test	160b



CHAPTER I

INTRODUCTION

The problems of preserving roughages for the feeding of livestock during unfavourable periods of pasture growth are perennial. The preservation of legumes and grasses as hay of high quality is governed mainly by two factors: ideal curing weather and stage of maturity of the crops. The inability of the farmer to control these factors results in heavy nutrient losses in the hays during the curing process.

The development of an alternate process of preservation has been the objective of investigators for many years. Artificial drying of protein rich herbage results in the best preservation with least storage loss but, as yet, the process involves a large capital outlay and high operating costs. This at present eliminates it from consideration by the average farmer. The preservation of early harvested material as silage seems to be the most logical approach to the solution of the problem because of the high efficiency of the process for timely handling.

Although silage-making appears to offer the best method of preserving protein rich herbage, many unsolved problems contribute to the uncertainty of the process and hinder its widespread adoption. Ensilage of immature herbage is invariably accompanied by high nutrient losses during the storage period. These losses, resulting mainly from inefficient chemical reactions within the silage, are such that usually only about 65 to 75 per cent of the dry matter ensiled is available for feeding at the termination of the storage period. Such losses equalize to a large extent

the possible saving of nutrients from field losses and weather damage which result when haymaking is used as a method of harvesting and storage.

The realization of the magnitude of nutrient losses from early harvested grass-legume silage provided the main incentive for research in this field. Improved methods of silage production, based on the principle of controlling undesirable chemical reactions and encouraging desirable reactions within the mass, have received considerable attention in recent years. A wealth of literature exists on the use of additives as a means of achieving these aims and thereby reducing nutrient losses during storage. Of the various additives employed for the production of high quality silage from protein rich crops, several have proved to be of value under certain conditions. As yet, however, no one additive has been found capable of general adoption by dairy farmers as a whole, either because of the cost of installation or technical ability necessary for the operation.

Several chemicals, which may bring about partial sterilization of the mass, have recently been introduced as additives in silage-making. American investigators have reported that the treatment of immature herbage at ensiling time with sodium metabisulphite markedly reduced storage losses and improved the quality of the resultant silage. Their results seemed sufficiently encouraging to warrant further research. Experimental work, to be detailed presently, was thus undertaken to assess the value of sodium metabisulphite as an additive in silage-making under New Zealand conditions. The programme of work commenced in 1954 with a preliminary field scale trial in which the effect of metabisulphite

treatment on the nutritive value and chemical composition of silage made from mature herbage was determined. A more extensive investigation was conducted the following season in which metabisulphite-treated and untreated immature and more mature silages were compared as to the nutrient losses incurred during storage, their nutritive value and chemical composition.