DRYING OF CONDITIONED HAY IN WINDROWS AS INFLUENCED BY ORIENTATION OF STEMS AND ENVIRONMENTAL CONDITIONS

by

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DRYING HAY IN WINDROWS

ABSTRACT

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DRYING OF CONDITIONED HAY IN WINDROWS AS INFLUENCED BY ORIENTATION OF STEMS AND ENVIRONMENTAL CONDITIONS

The present investigation is concerned with advantages in drying obtained through reorientation of crushed hay plants in windrows formed by a self propelled windrower.

Some physical characteristics of hay windrows were measured. The effects of changes in stem orientation and windrow configuration on the drying characteristics of hay were examined. The influence of environmental conditions of wind velocity and solar radiation on the drying of crushed hay in windrows of different configurations and plant orientations have been reported.

Drying curve comparisons, analysis of variance techniques and Duncan's new multiple range test have been used to establish significant differences in drying characteristics of windrows having different plant orientations and subjected to varying environmental conditions.

RESUME

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M.Sc. - Génie Rural

INFLUENCE DE L'ORIENTATION DES TIGES ET DE L'ENVIRONNEMENT SUR LA VITESSE DE SECHAGE DU FOIN CONDITIONNE DISPOSE EN ANDAINS

L'objet de cette présente étude est d'étudier les avantages du séchage du foin conditionné, en le réorientant dans les andains formés par une andaineuse automotrice.

Quelques caractéristiques physiques des andains ont été mesurées. Les effets provoqués par le changement de l'orientation des tiges ainsi que la configuration des andains, sur le séchage du foin conditionné disposé en andains de différentes formes et orientations des plantes ont été rapportés.

Des études comparatives des courbes de séchage, des analyses de variances, ainsi que le nouveau test de Duncan, ont été utilisés pour faire apparaître les différences significatives entre les caractéristiques de séchage des andains soumis à des conditions environnantes variables et dont les plantes étaient orientées différemment.

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I. INTRODUCTION AND OBJECTIVES OF THE STUDY

Hay cut at 70 to 80 per cent moisture content, wet basis (wb), is dried to a moisture level of about 20 per cent for safe storage (Hall, 1957). Two simultaneous and fundamental processes occur during this drying period: (1) heat is transferred to the hay plants, and (2) mass is transferred as water in liquid or vapour phases within hay plants and as vapour from wet surfaces. In the study of hay drying, therefore, the internal mechanisms of liquid flow in cut plants and the external conditions of the material as well as the surrounding environment are important.

The internal mechanisms demand an understanding of anatomy and physiology of plants pertaining to moisture escape. Distribution of water in green plants (Pedersen and Buchele, 1960), the role of leaves and stomatal behaviour (Jones and Palmer, 1933, 1934; Jones, 1939; Pedersen and Buchele, 1960), and the unequal drying rate of leaves and stems (MacAulay, 1966) are some of the considerations that are important to engineering design of drying systems.

The external conditions of the material and the environment jointly influence external or surface resistance to diffusive and turbulent vapour flow through air surrounding the plant surfaces. Windrowing and tedding (Halyk and Bilanski, 1966; Kurtz and Bilanski, 1967, 1968) and raking (Jones, 1939; Goss et al., 1964) are some of the engineering attempts to alter material conditions. The external conditions of environment include dry and wet bulb temperatures, wind velocity and solar radiation (Kemp and Roach, 1968).

The study of external conditions of the material is important because such conditions can be altered to accelerate the drying rate. During the field drying of hay, no control of the environment is possible, but a knowledge of the effects of varying environmental conditions on drying with an objective to define good and poor drying conditions is important.

Drying of hay in windrows is an accepted practice. However, no investigation of the effects of orientation of stems in a windrow on the drying rate of hay was available in the cited literature. Also, basic considerations, such as uniformity in windrow configuration and windrow density, have remained neglected so far. These variables are likely to affect the rate of drying hay in windrows and perhaps the quality of hay produced.

The objective of the present investigation was to determine the effects of changes in windrow configuration and orientation of stems in a windrow on the drying characteristics of hay. In windrowed material, an accumulation of vapour within air spaces of the bulk decreases plant to air vapour pressure gradient and lower rate of drying results. The rate of air movement from the air spaces within the bulked material to open air beyond would affect the drying rate of hay. Solar radiation could be effective in augmenting heat transfer. The effects of stem orientation on drying due to wind and solar radiation therefore formed an important part of this study.

II. REVIEW OF LITERATURE

A search of literature revealed that the limitation of drying hay in the field lies in the loss of feed value of weather-damaged hay. Oliver (1960) reported that this loss can be as high as 25 to 40 per cent. When hay can be field-dried without being rained on, there is little difference in chemical constituents obtained, based on feeding trials as compared to barn-dried hay (Hodgson _et al_., 1946, 1947). This is not always possible because the period between rains is often less than the time required for drying during the haying season. The situation is further complicated by the fact that the feed value of hay decreases with excess maturity (Hopkins, 1955; Mowat _et al_., 1965). Pritchard _et al_. (1963) have reported a decrease in the _in vitro_ dry matter digestibility of hay at the rate of 0.5 per cent per day throughout the growing season.

In order to minimize field drying losses it is important that the period for which hay is subjected to weather uncertainties is the shortest possible. Since the drying of hay is influenced jointly by internal mechanisms of water movement in the plant material and the conditions external to the material, these factors should be optimized to accelerate the drying rate of hay.

2.1. Theory of Hay Drying

As the initial moisture content of hay is less than the critical moisture content (the point on the drying curve where the constant rate period ends) nearly all the drying occurs in the falling rate period. This period of drying involves (1) the movement of moisture within the material to the surface by liquid diffusion, and (2) the removal of moisture from the surface.

The falling rate period of drying is usually divided into two zones: (1) the zone of unsaturated surface drying, and (2) the zone where internal moisture movement controls drying rate. In unsaturated surface drying, the entire evaporating surface is no longer maintained at saturation by moisture movement within the hay plants. The drying rate decreases for the unsaturated portion and consequently the average rate for the total surface decreases. The external drying variables are functional during this drying zone. At some internal moisture content, nearly whole evaporating surface becomes unsaturated and the internal mechanisms such as liquid diffusion govern the rate of drying.

The equation representing movement of moisture during the falling rate period is based on Newton's equation. By substituting moisture contents, dry basis (db), for temperature in Newton's equation, equation (1) has been obtained (Hall, 1957).

$$\frac{M - M_e}{M_o - M_e} = e^{-kx}$$

where M is the moisture content, db, at any time in hours, x; M_e is the equilibrium moisture content; M_o is the original moisture content; and k is the drying constant. $\frac{M - M_e}{M_o - M_e}$ is known as the moisture content ratio. Another way of representing the drying data is given by the equation:

$$\frac{M - M_e}{M_o - M_e} = e^{-kx^u} \tag{2}$$

where u is an experimental constant of value less than one.

2.2. Internal Mechanisms

The present understanding of hay drying is based on existing theories of drying of nonliving industrial material. Experience has verified that such theories serve to describe the drying nature of those parts of plants that have reached a dormant stage, such as seeds and woody tissue. Unfortunately, the same does not hold for parts of plants such as leaves and growing stems. As a consequence it is generally recognized that a fundamental understanding of anatomy and physiology of drying plants is important to identify the natural drying forces which respond to mechanical treatments during the process of hay drying. Distribution of water in green plants, the role of leaves and stomatal behaviour and the unequal drying rate of leaves and stems are some of the aspects of internal moisture movement in cut plants that have been studied.

2.2.1. Distribution of water in green plants

Pedersen and Buchele (1960) conducted studies on water distribution in alfalfa plants at three stages of maturity. They concluded that moisture varied in leaves and stems and the decrease in moisture content per unit length was considerably larger in the top end than in the lower part of the stem.

The highest moisture content was found in the growing section of the plant. In the stem section just below the top end the moisture content in young alfalfa plants in prebloom stage and middle age alfalfa plants in one-tenth bloom stage (normal maturity for hay), was found to range from 83.5 to 85.5 per cent, wb. In old alfalfa plants past full bloom (one-fourth seed pods), the moisture content at the same place was found to be about 76 per cent, wb.

The lowest moisture content of all plants was near the root. It was 60 per cent, wb, in old plants and 72 per cent, wb, in middle age and young alfalfa.

These findings imply that in order to increase the drying rate of hay, orientation of plants in a windrow should be such that the plant sections which have highest moisture content and contain most moisture but lose moisture less readily should be more exposed to the external drying conditions of the environment. This is not always possible because: (1) the part of the plant that has highest moisture content does not necessarily contain most moisture, (2) the part that contains the highest moisture content usually dries fastest, (3) the part which loses moisture less readily could be at the opposite end of the part that has the highest moisture content.

It is not likely that all the drying advantages can be obtained in a single orientation of the plants in hay windrows.

An ideal theoretical solution to the problem does not exist at present because of the many unknown factors. However, it should be possible to identify an orientation of plants which is most suitable from the standpoint of faster drying of hay in windrows.

2.2.2. The role of leaves and stomatal behaviour

Based on their experiments with cut plants of Johnson grass, Jones and Palmer (1933) concluded that moisture is conducted to the leaves through the vascular bundles in the stems. Their finding that leaves dry faster when removed from alfalfa plants than when attached, was later confirmed by Pedersen and Buchele (1960). These results led to the conclusion that stem moisture does move into the leaves.

Jones and Palmer (1933) found that the time required after cutting for drying to a given moisture content was lower for complete plants of alfalfa and Johnson grass than for separated leaves and stems. Pedersen and Buchele (1960) found no difference between these two drying periods. Because of these contradictory results the role of leaves in moisture removal from cut plants still remains unexplained. The findings on stomatal behaviour (Miller, 1928; Jones and Palmer, 1932, 1933) are not conclusive in regard to the amount of moisture loss per unit of time.

However, the studies on these aspects suggested that the orientation of plants in a windrow should be such that the leaves remain in a position that favours evaporation of water carried to them by the vascular bundles. Also the leaves should be so placed as to favour the desired stomatal behaviour.

2.2.3. Different drying rate of leaves and stems

Pedersen and Buchele (1960), MacAulay (1966) and other investigators have shown that the leaves of cut plants dry faster than the stems. The practical significance of this differential in drying rate of leaves and stems is that during the harvesting process under good drying conditions, the leaves of hay may be dried to levels where they become susceptible to leaf loss because of shattering, while the stems of the same plants contain too much moisture for safe storage.

Zink (1936), Macdonald (1946), Dobie (1948) and Daum (1958) have published researches on leaf loss during field drying of hay. The variance within and among their findings is large. However, leaf losses as high as 70 per cent were reported for alfalfa at 30 per cent moisture content by Zink (1936). As approximately 70 per cent of the protein and 90 per cent of the carotene are contained in the leaves it goes without saying that this loss must be minimized.

It was found by MacAulay (1966) that birdsfoot trefoil leaves become brittle at moisture content of 15 to 18 per cent, wb. Since this critical moisture content is lower than the baling moisture content a reduction in leaf loss is possible through improvements in hay handling techniques. Improvements in techniques would require that stems and leaves dry at similar rates. Orientation of plants in a windrow could affect the drying rates and deserve to be carefully investigated because of the possibility of reducing crop losses.

2.2.4. Mechanical treatments to promote internal mechanisms

Treating hay mechanically to speed moisture removal is an established practice. The published researches show that crushing results in faster drying than crimping (Boyd, 1959). Also, crushing (Bruhn, 1955, 1959; Kepner *et al.*, 1959, 1960; Halyk and Bilanski, 1966; Kurtz and Bilanski, 1967, 1968) as well as crimping (Kepner, 1959, 1960) are considerably more effective when compared to drying of unconditioned hay. The findings on windrow drying rates following crushing and flail mower treatments are contradictory. Halyk and Bilanski (1966) and Kurtz and Bilanski (1967) found crushed hay to dry quicker than the flail mowed hay, whereas Boyd (1959) and Hall (1964) found the opposite to occur. However, there seems to be a general agreement in favour of crushing when over-all performance and field losses are considered. A self-propelled windrower equipped with crushing rolls was therefore used in the present investigation.

2.3. External Conditions

The term external conditions in the literature on drying of solids includes: (1) external conditions of the material, and (2) external conditions of the environment (Perry *et al.*,1963). Study of drying based on effects of external conditions although less fundamental, is more generally used because the results have a greater immediate application in equipment design and evaluation.

2.3.1. External conditions of the material

A review of developments in hay handling equipment pointed out that agricultural engineers have been concerned about altering conditions of the material for accelerating the field drying rate of hay ever since the invention of mechanical hay tedder in 1850. The use of tedders and windrowers, and the practice of raking to turn hay windrows, are some of the engineering attempts to alter material conditions. Tedding (Halyk and Bilanski, 1966) and raking (Jones, 1939; Goss *et al.*, 1964) have been found to be effective but are not popular because they are additional operations. The present research is concerned with the placement of hay plants in windrows formed by a self-propelled windrower. The considerations that are important to such an investigation include: (1) swath versus windrow drying, and (2) the windrow configuration and orientation of stems.

2.3.1.1. Swath versus windrow drying

In spite of the faster drying rate reported when crushed hay is left to dry in swaths (Halyk and Bilanski, 1966; Kurtz and Bilanski, 1967) windrow drying is preferred in many instances on account of higher capacity, reduced leaf loss, better pick up of lodged, tangled and rained hay, reduced soil compaction effects and savings in equipment, fuel and manpower costs.

The choice of windrow drying in the present investigation was based on the greater variability in orientation of stems being possible in a windrow than in a swath. This is so because the position of hay plants in windrows can be altered in three dimensions whereas in swaths such a change is limited primarily to the horizontal plane because the thickness of swaths is generally small.

2.3.1.2. Windrow configuration and orientation of stems

Dodds and Dick (1967), in working with cereal grains, stated that a good windrow should be firmly supported on the stubble, be capable of shedding water and be in a position of easy recovery by the combine pick up. Relationships between the physical characteristics of windrows and drying rate of hay were not available in the cited literature.

The present investigation is devoted to determining effects of changes in windrow configuration and orientation of stems in a windrow on the drying rate of hay. Also the windrow density and uniformity in windrow configuration are likely to influence the drying characteristics and quality of hay produced. A study of these variables, therefore, should be of value in understanding the kind of plant orientation that is desired to improve drying rates and the quality of the product.

2.3.2. External conditions of environment

Drying rate of field dried hay varies greatly with change in environmental conditions. Therefore, in evaluating drying rates, results from one area are of little significance for applying to another climatic condition or geographic location. Kepner et al. (1960) has reported a drying period of four to six days in the interior valley of California whereas Halyk and Bilanski (1966) have reported similar drying effects in 28 to 32 hours in Ontario. Furthermore, results of Halyk and Bilanski show a considerable difference between drying rates in Guelph and Kemptville which are only 300 miles apart. It was therefore considered important to study the variability of environmental conditions during the field drying period of hay in a typical climate of southwestern Quebec.

The conditions favourable for high transpiration rate in living plants are high temperature (Brigs and Shants, 1916); low relative humidity (Thomas and Hill, 1937); moderate wind speeds and high intensity solar radiation. One would expect similar effects of these variables on drying of cut plants.

Fortin (1965) has reported variation in climatic variables during the drying period of hay. He studied the effects of relative humidity changes on field drying of hay. Zachariah and Lipper (1966) have suggested use of wet bulb depression rather than relative humidity as a drying variable.

It is evident that people have been concerned about the effects of solar radiation on hay drying characteristics from the statements, "the protection of leaves from the parching action of the sun seems to greatly reduce the shedding and consequently make a much better grade of hay"; and, "the hay is bleached of some of its green colour by the sun" (Jones and Palmer, 1936). Realizing the importance of this drying variable Fortin (1965) has reported the periods of sunshine in the hay drying studies conducted by him. However, the effects of solar radiation as a climatic variable in hay drying have not been reported in the available literature. One of the objectives of this research was to measure the solar radiation effects on drying of crushed hay in windrows of different configurations and stem orientations.

Shepherd (1965) investigated the effects of air speed on the drying rates of harvested clover and rye grass. He estimated effective external resistances* of material in swaths and windrows to be 8 to 12 times those of plant units exposed singly. He also reported that swaths and windrows in still air and under low field radiation dried respectively at approximately 0.3 and 0.2 times the rate of single units over the high moisture content range, at 0.45 to 0.4 times over the medium range and at 0.6 times over the low range. When air speed was nonlimiting the rates of drying of both swaths and windrows under low radiation conditions were 0.6, 0.9 and 0.9 times

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*External resistance refers to the resistance offered to diffusive and turbulent vapour flow through the air surrounding the plant.

those of single units over the high, medium and low moisture ranges respectively.

Jones and Palmer (1936) found that the direct exposure of plants to the open air and sunshine dried plants at a rate which was higher than the drying rate of material in swaths but lower than the drying rate of windrowed material. These findings do not agree with results found by Shepherd (1965).

In both the studies mentioned above, a swath consisted of a continuous blanket of mown material resting on pasture stubble in the form in which it fell from the mower. Windrows consisted of one to three swaths raked together in the study conducted by Shepherd and two windrows raked together two hours after cutting in the experiments of Jones and Palmer.

It appears that wind speed plays an important role in the field drying of hay. In view of this fact an additional objective of this study was to determine the effect of wind on drying characteristics of hay windrows having various configurations and stem orientations.

The concepts of equilibrium moisture content, latent heat and latent evaporation are pertinent to the present investigation on the drying effects of environmental variables. A brief review of the significance of these variables with reference to important publications is therefore included here.

2.3.2.1. Equilibrium moisture content

Hay is an hygroscopic material. When exposed to a given set of environmental conditions until equilibrium is reached, it will attain a definite moisture content. This moisture is termed the equilibrium moisture content for the specific conditions. At this moisture content the rate of moisture loss from the product is equal to the rate of moisture gain of the product from the surrounding atmosphere. Thermodynamically, equilibrium is reached when the free energy change for the material is zero.

Equilibrium moisture content is represented by the following empirical equation (Henderson, 1952).

$$1 - RH = e^{-cTM_e^n} \tag{3}$$

where

RH = relative humidity represented as decimal

T = absolute temperature, deg R

M_e = equilibrium moisture content, per cent, db

c and n = constants varying with materials.

The concept of equilibrium moisture content is important because:

(1) it represents the limiting moisture content of the material for specific conditions of humidity and temperature

(2) having this information for any specific hay, it would be possible to study temperature and rate of air movement as factors of drying, if the relative humidity of the atmosphere

remained unchanged sufficiently long for the material to reach equilibrium moisture

(3) by superimposing equilibrium moisture content data on a psychrometric chart, the vapour pressure of the material can be readily determined.

Equilibrium moisture contents of various hays have been reported by Davis et al. (1950), Dexter et al. (1947) and Zink (1935).

2.3.2.2. Latent heat

In many drying applications the equilibrium moisture data may be used as a basis for determining latent heat. Based on Clapeyron equation, Othmer (1940) proposed the use of an equation of the form:

$$\frac{dP}{dT} = \frac{L}{(V-v)T} \tag{4}$$

where

P = vapour pressure, lb per sq ft

T = the absolute temperature, deg R

V = the specific volume of saturated water vapour, cu ft per lb

v = the specific volume of saturated liquid water, cu ft per lb

L = the latent heat of vaporization, ft-lb per lb.

Gallaher (1951) developed the following equation relating the vapour pressures and latent heats of two substances at the same temperature, namely a farm crop and water vapour.

$$\frac{L}{L'} = \frac{\log P_2 - \log P_1}{\log P'_2 - \log P'_1} \tag{5}$$

where L and P represent the latent heat and vapour pressure for the farm crop, and L' and P' represent the latent heat and vapour pressure of free water, respectively. Thus, the latent heat ratio of the product and water can be expressed in terms of the moisture content if equilibrium moisture content data are available for several temperatures.

2.3.2.3. Latent evaporation

Latent evaporation measures the integrated effect of solar radiation, dry and wet bulb temperatures and air velocity on the evaporation rate of water from a wet plane, horizontal black surface exposed to climatic conditions. An equation has been developed by Kemp and Roach (1968) for estimating the drying rate of hay based on latent evaporation of the environmental conditions. This relationship has been expressed in equation (6).

$$\log X = AY + \log B \qquad (6)$$

where

X = the instantaneous moisture content of hay, per cent, db

Y = instantaneous drying rate, gms of water per 100 gms of dry sample weight per hour

A and B = constants.

The value of the constant A, in their investigations, varied from 0.0162 to 0.0358 but there is an indication that A may have a single value. The constant B is the equilibrium moisture content of hay for a specific latent evaporation and would depend upon plant species, maturity and treatment.

2.3.3. Effects of external conditions on internal mechanisms

External conditions have been found to influence physiological behaviour of drying plants. It has been established that cellular permeability to moisture increases with temperature (Meyer and Anderson, 1952). Hassler (1959) demonstrated that under dynamic conditions, the internal mechanisms were affected by higher temperatures in such a manner so as to permit freer movement of moisture at a particular vapour pressure. Based on the principles of thermodynamics and heat transfer, he built up a theoretical model of energy balance equating intensity of radiation or rate of energy input to rate of energy loss from a leaf to its surroundings.

2.4. Determination of Moisture Content

The importance of a precise method for determination of moisture content is evident from the literature available on this subject as reviewed by Marshall (1953) and Thompson (1958). But unfortunately standard research procedures have not been established yet. This has resulted in use of many methods for moisture content determination (Table 1) by different researchers investigating drying characteristics of hay.

Methods of determining moisture content of hay have been broadly classified as direct and indirect. Direct methods consist of oven drying, drying with desiccants or distillation.

Of these oven drying is most commonly used because it is simple, reasonably rapid and does not involve expensive equipment. Indirect methods measure some electric, dielectric, chemical or hygroscopic property of material which depends on moisture content. The measured value of the variable is then related to the moisture percentage. Because of low accuracy and poor repeatability the use of indirect methods is limited to commercial needs.

Two ways in common use for expressing moisture content are wet basis and dry basis. Wet basis expresses the weight of the moisture as a percentage of sample weight. Dry basis relates the moisture weight to the weight of dry material in the sample. Relative merits of the two ways and common errors in their use are available in literature (Clyde, 1943). Wet basis is used commercially for determining hay prices (Hall, 1957) and was therefore used in the present investigation.

The drying methods reported in Table 1 point out the variability in procedures. Such variability does not permit comparison of results from investigations which are otherwise similar in nature. Temperature, pressure and duration of treatment are variables which will need consideration in standardizing drying technique. The problem, however, is complicated because of the fact that decomposition of biological material has been found to occur at comparatively low temperatures while, on the other hand, the intensity with which some of the moisture is held suggests that it may not all be removed at "safe" temperatures, even at very low vapour pressures.

TABLE 1. Methods used for determining moisture content of hay

No.	Method	Temperature	Duration	Reference
	(1)	(2)	(3)	(4)
1.	Oven drying: 2 gms of air dried sample (Analysis of Fodders Sub-Committee 1931-1944)	95-105°C (203-221°F)	Until the loss in wt does not exceed 1 mgm/hr	Agric.Prog. (1945)
2.	Drying over P_2O_5 at 10 micron pressure	40°C (104°F)	-	Laidlaw and Wylam(1952)
3.	Drying over P_2O_5 at a pressure of 50-100 microns (official method recognized by National Institute of Health in U.S. for freeze dried biological materials)	50±1°C (112±1.8°F)	-	Beckett (1954)
4.	Toluene distillation; Drying under vacuum; Oven drying; Drying in an airblast cabinet	 95°C(203°F) 105°C(221°F) 46-54°C (115-129°F)	- - - -	Mitchell (1957)
5.	Oven drying in a forced air oven	77°C(170°F)	24 hrs	Boyd (1959)
6.	Oven drying; Drying over P_2O_5; Drying under sustained pressure of the order of 1 micron	80°C(176°F) 40°C(104°F)	16 hrs Until constant weight is attained (App.72 hrs)	Greenhill (1960)
7.	Oven drying	125.8°C (195°F)	30 hrs	Person & Sorenson (1962)
8.	Oven drying	100°C(212°F)	72 hrs	Hall (1964)
9.	Oven drying	80°C(176°F)	-	Shepherd(1964)
10.	AOAC oven drying method for grain and stock feeds	135 ±2°C (275±3.6°F)	-	Horwitz (1965); Halyk and Bilanski(1966); Kurtz and Bilanski (1967,1968)

Note: Unless mentioned otherwise, drying was carried out at atmospheric pressure.
Where drying time is not shown in column 3, the duration of the treatment was given as "to constant weight" or "overnight."

The oven drying methods for determining moisture content of hay involve two main sources of error. The first is associated with continuing metabolic activity causing loss of material during drying of freshly harvested plants. McRostie and Hamilton (1927), Raymond (1951) and Davies *et al.* (1948) have investigated this problem. The second error arises from difficulty of completely removing the water from plants at a temperature which will not cause serious decomposition of plant material. Greenhill (1960) has conducted a comprehensive study on this aspect. While working with white clover, alfalfa and short rotation ryegrass he concluded: "Sufficient accuracy would be obtained by oven drying at 80°C at atmospheric pressure and for a standard period, say 16 hours."

His experiments consisted of oven drying hay samples at atmospheric pressure and:

(i) at 105°C (221°F) for periods of 3, 6, 16, 24, 48 and 96 hours

(ii) at 80°C (176°F) for the same periods

(iii) at 95°C (203°F) for 16 hours.

At temperatures of 105°C (221°F) and 80°C (176°F) the loss of weight in terms of duration of drying was found to be a logrithmic relation of the form:

$$L = a \log T + b \tag{7}$$

where: L = loss of weight, per cent

T = duration of drying, hrs

a and b = constants.

The reported values of "a" and "b" were as follows:

Material	Temperature			
	105°C (221°F)		80°C (176°F)	
	"a"	"b"	"a"	"b"
White clover	1.04	0.85	0.21	0.12
Alfalfa	0.63	0.10	0.17	0.00
Ryegrass	0.94	0.30	0.06	0.08

Greenhill (1960) also found that, white clover and alfalfa would begin to decompose and lose dry matter at a temperature somewhere between 60°C (140°F) and 70°C (158°F). The value for ryegrass was estimated to lie between 70°C (158°F) and 80°C (176°F). However, while the method proposed by Greenhill has been used in the present study, it is well understood that at 176°F the pasture material does not attain a constant weight but the rate of loss of weight, after moisture removal can be assumed to have ceased, is very low. It is also acknowledged that some small amount of hygroscopic moisture will not be removed because of vapour pressure of air in which samples have been dried. The average residual moisture reported by Greenhill for samples dried at 80°C (176°F) was 0.5 per cent and will vary according to the actual vapour pressure of the atmosphere.

III. MATERIALS AND METHODS

3.1. Design of Experiment

Two experimental trials, each consisting of a randomized complete block design having five treatments and four replications, were conducted. Table 2 summarizes the treatments.

TABLE 2. Treatments performed on hay windrows

Treatment no	Treatment	Figure no
1	Natural windrow	1a; 4a
2	Inverted windrow	1b; 4b
3	Trampled windrow	1c; 4c
4	Trampled windrow shaded	1d
5	Natural windrow shaded	1e

Natural windrow refers to the undisturbed windrow as formed by the self-propelled windrower. The plants in this windrow were placed by the machine in a nearly upright position with heads pointing upward (Figures 1a; 4a). The inverted windrow was made by turning the natural windrow upside down. The heads of the plants in this windrow were pointing down (Figures 1b; 4b). The trampled windrow was formed by trampling the natural windrow. Trampling was used to reduce the included angles of the plants with the horizontal and increase the windrow density (Figures 1c; 4c).

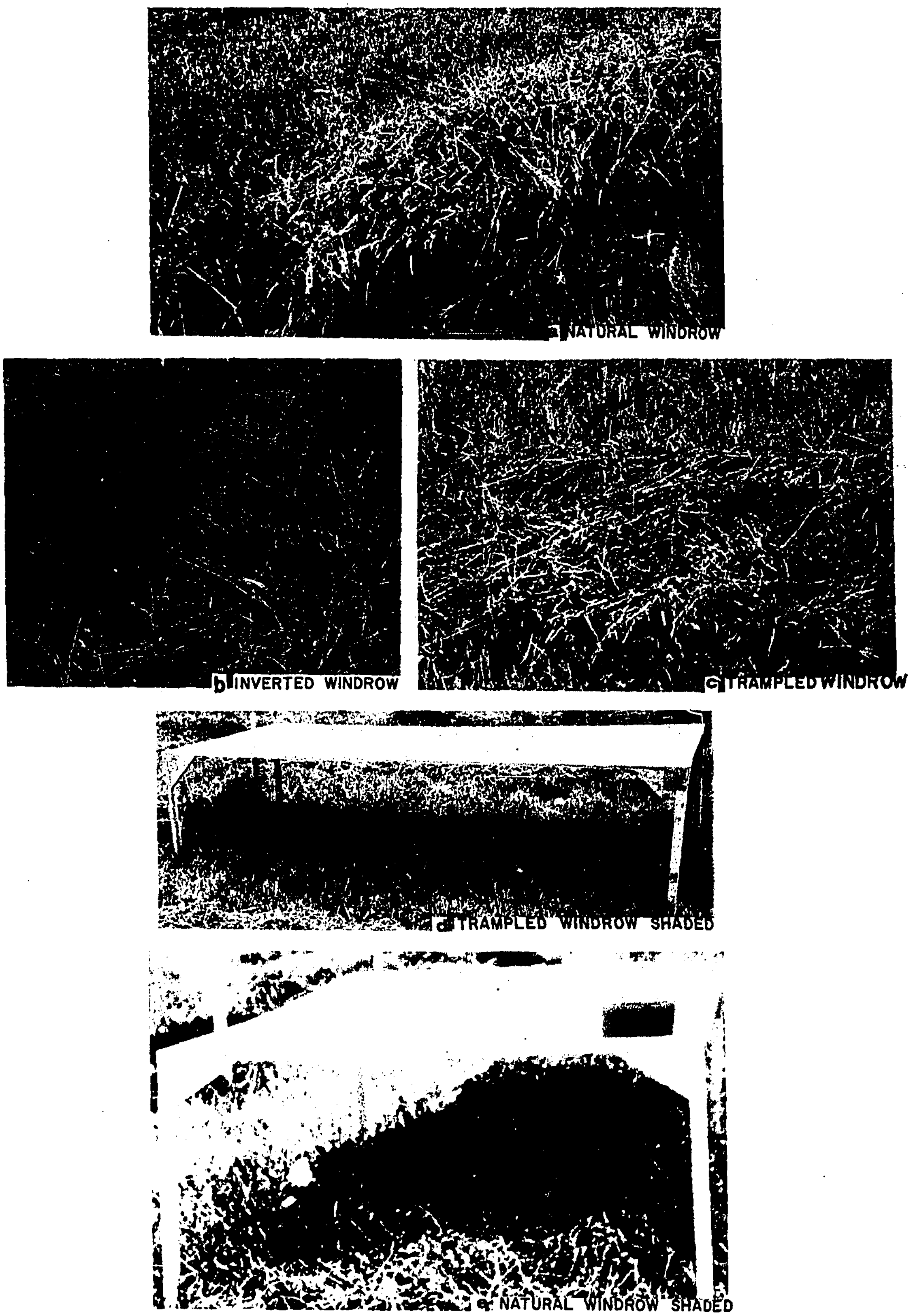


Fig. 1. Treatments performed on hay windrows.

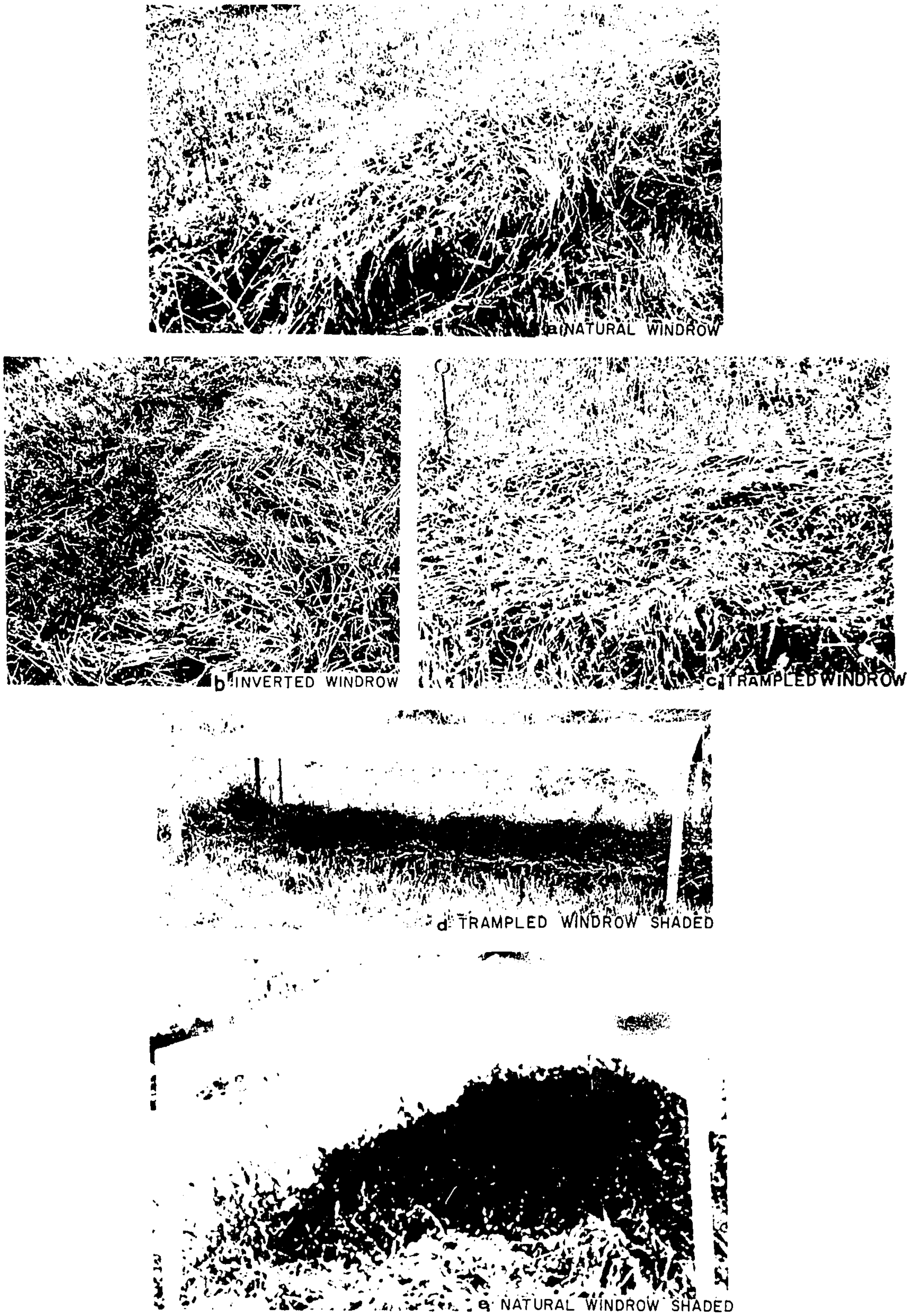


Fig. 1. Treatments performed on hay windrows.

Shade was provided by 3/4 inch thick, 5 x 10-foot plywood sheets (Figures 1d, 1e) supported at a height of 2 1/2 feet over the windrow sections. Both sides of the plywood sheets were painted with two coats of white enamel paint. Complete shade was observed on the shaded sections between 8:00 am and 6:00 pm throughout the duration of the experiment. Shades were removed at 6:00 pm to provide similar conditions for moisture regain at night by the shaded and unshaded sections.

In the first trial which was conducted at the Macdonald College Farm, the first cut of a mixture of bromegrass and timothy was used as experimental material. The second trial was performed on the first cut of a red clover and alfalfa mixture on a private farm in the vicinity of Macdonald College.

3.2. Machine Description

The New Holland model 905 self-propelled windrower equipped with a 10-foot draper header and bat reel (Figure 2a) was used in this investigation. The plants cut by the central part of the cutter bar were guided by the reel to the central delivery opening which was 40 inches wide. The crop cut by the knife sections on either side of this central part fell on two rubberized canvas aprons with wooden slats which carried the material to the central delivery opening. The plants from the windrow thus formed passed through the "spiroll conditioner" consisting of a pair of counter-rotating crushing rolls, 8 inches in

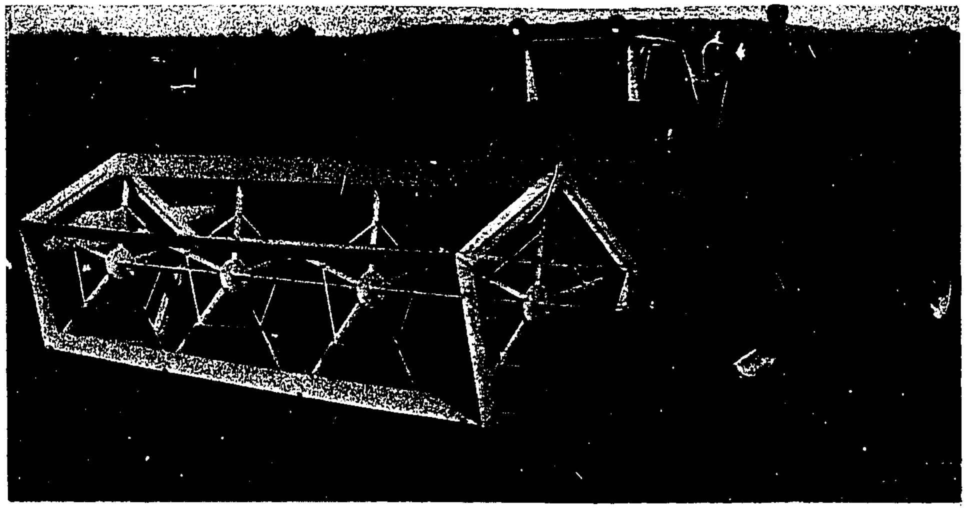


Fig. 2a. New Holland self propelled windrower model 905 (Sperry Rand Corp.).

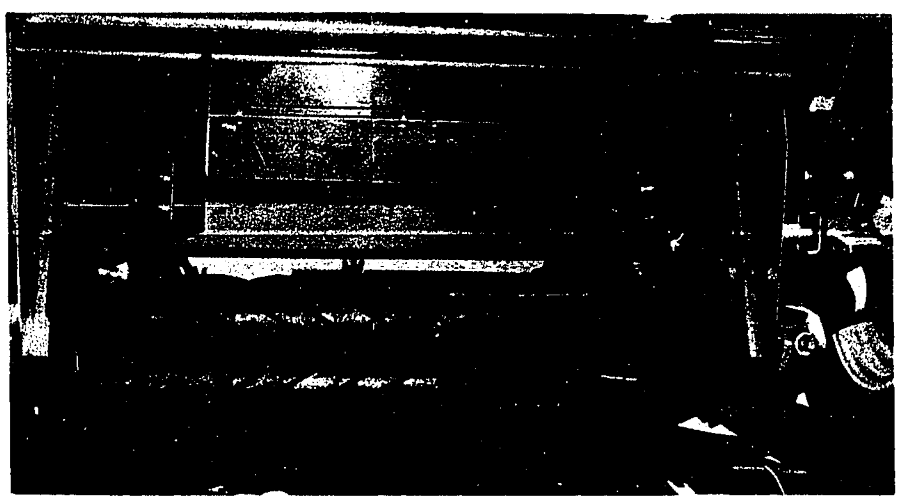


Fig. 2b. Spiroll Conditioner - 49 inches long, 8 inches in diameter counter rotating crushing rolls (Sperry Rand Corp.).

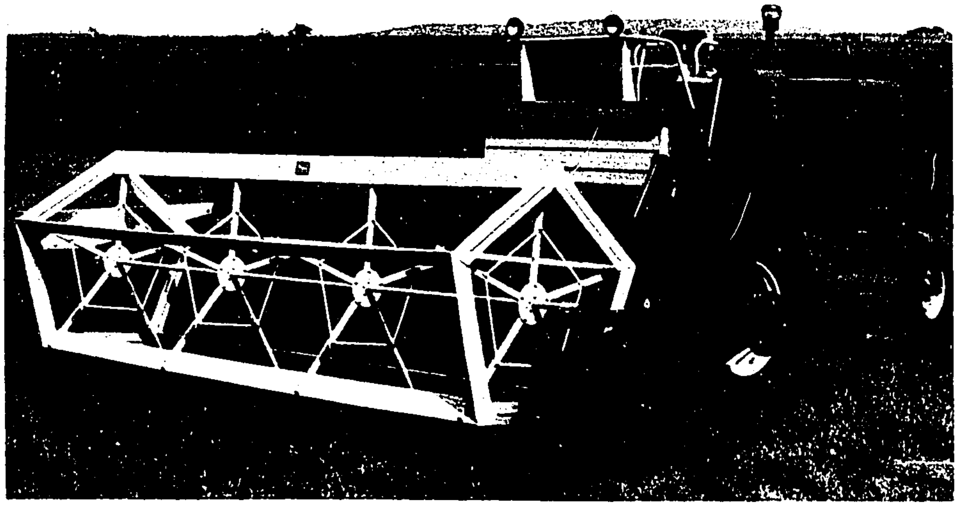


Fig. 2a. New Holland self propelled windrower model 905 (Sperry Rand Corp.).

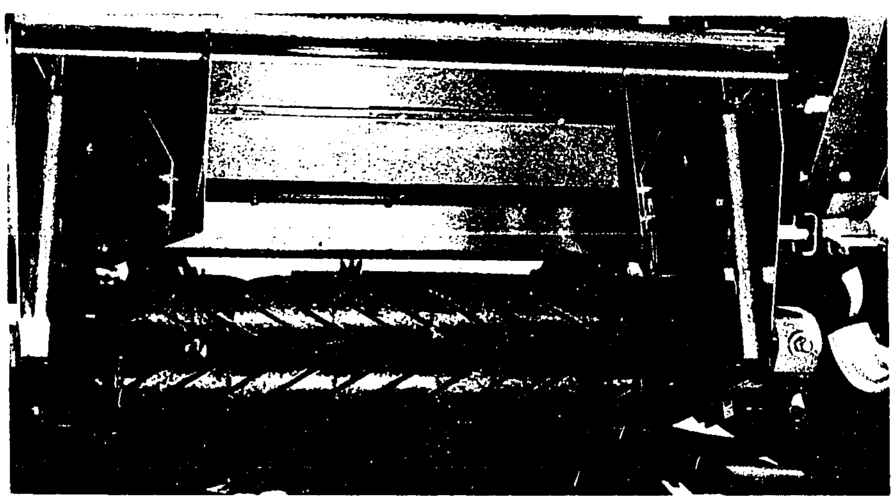


Fig. 2b. Spiroll Conditioner - 49 inches long, 8 inches in diameter counter rotating crushing rolls (Sperry Rand Corp.).

diameter and 49 inches long (Figure 2b). After passing through the crushing rolls, the material was placed in windrows by a deflector shield on the rear of the machine.

The machine was operated at approximately 4 miles per hour. It was felt that uniform forward speed was important for uniformity of windrow configuration.

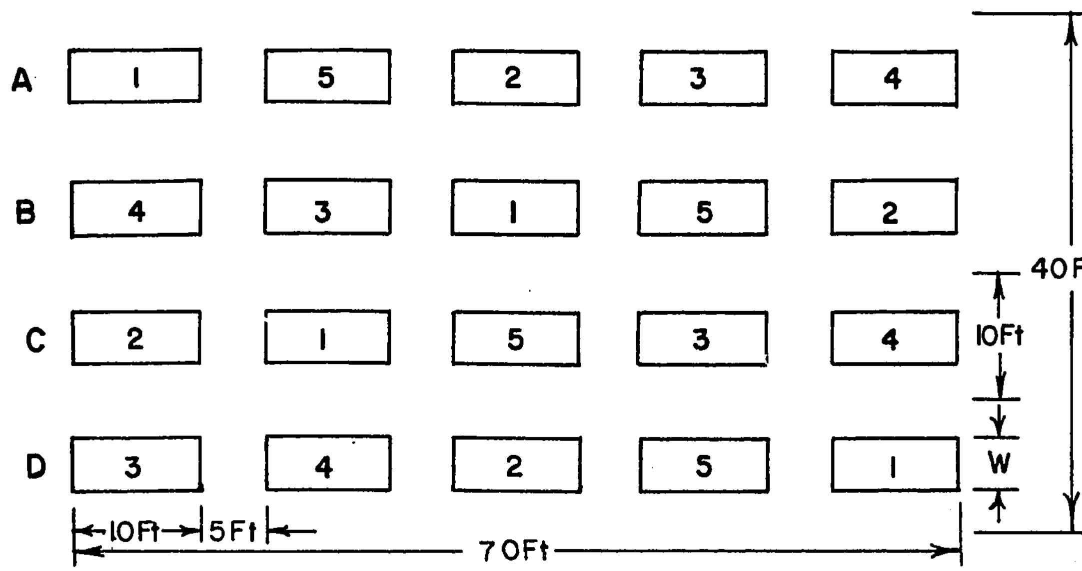
3.3. Experimental Procedure

A test area approximately 40 x 70 feet (Figure 3) was chosen at each of the two locations. Treatments as listed in Table 2 were performed on the hay windrows soon after they were formed. The experimental blocks were designed to contain 70-foot lengths of four successive windrows. The treatments within the blocks were applied to 10-foot long sections of the windrows within each experimental block, leaving a 5-foot length of untreated windrow between adjacent treatments.

Time involved in carrying out the required treatments subsequent to cutting affects results considerably (Shepherd, 1957). Therefore, treatments within the blocks were completed simultaneously, limiting the total time for treatments in all four blocks to 30 minutes. The order of treatments was randomized within each of the four blocks.

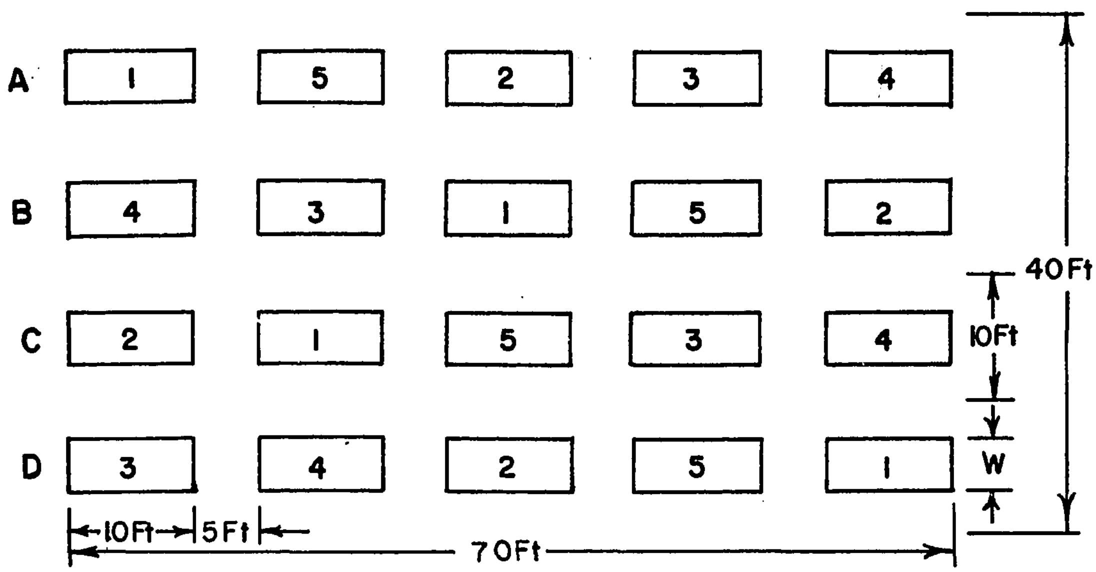
3.3.1. Measurement of physical characteristics of windrows

Orientation of plants in the natural windrow were measured by recording prominent vertical and horizontal angles



Letters (A, B, C, D) refer to the blocks
Numbers (1, 2, 3, 4, 5) refer to the treatments as listed numerically in Table 2
W denotes the windrow width

Fig. 3. Layout of the experimental field.



Letters (A, B, C, D) refer to the blocks
Numbers (1, 2, 3, 4, 5) refer to the treatments
as listed numerically in Table 2
W denotes the windrow width

Fig. 3. Layout of the experimental field.

at which stems were arranged. The altered orientation of plants after the processes of inversion and trampling were described by measuring windrow configuration before and after the treatment. Windrow configuration was described by measuring width and height of the cross-section of windrows under each of the five treatments at 2-foot intervals along the windrow length. At each interval, height was measured at the center of the windrow and at one edge of it. Equivalent height of the windrow was defined as the average of these two heights. From these width and height measurements, cross-sectional areas at 2-foot intervals of the windrow length were computed on an IBM system 360/75.

3.3.2. Measurement of environmental conditions

A portable weather station was set up in the experimental field. The climatic variables that were recorded at regular intervals included dry bulb and wet bulb air temperatures, grass temperature by the side of the windrow, wind velocity and net solar radiation absorbed by the windrow.

A sling psychrometer was used for recording dry bulb and wet bulb air temperatures. Wind velocity was measured at an approximate height of 6 feet above ground level using a hand-held anemometer. The climatological data thus recorded appears in Appendix B.

A black globe thermometer proposed by Pereira, Bond and Morrison (1966) and a "Multiriter" recorder manufactured by

Texas Instruments were used to determine net radiation supplied to the windrow by the sun. The values of net radiation at 1/2 hour intervals are shown in Appendix C.

3.3.3. Sampling technique and moisture determination

Samples were required at various stages of drying for moisture determination. The "grab" sampling technique of Halyk and Bilanski (1966) was used. Two samples from each replication of a treatment were taken at the time of cutting, at 12:00 noon and at 6:00 pm on the first day and at 8:00 am, 12:00 noon and 6:00 pm on days subsequent to cutting. Additional samples (two from each replication) were taken during the second trial from the shaded and unshaded natural windrows to provide moisture contents at two-hour intervals between 8:00 am and 10:00 pm. Samples scheduled at 6:00 pm on July 16 were not taken because it was raining then. The sampling was resumed at 9:00 am on July 17.

Drying which occurs during the time of sampling of plots demands that sampling time be kept to a minimum. This time was limited to a maximum of 25 minutes for 40 samples taken at each of the 8:00 am, 12:00 noon and 6:00 pm samplings and a maximum of 10 minutes was allowed for the 16 samples taken at two-hour intervals mentioned above.

Samples were sealed in polythene bags and stored at 35°F until they were used for moisture determination. The moisture contents were determined by oven drying the samples at 80°C

($172^{o}F$) for 16 hours according to the recommendation of Greenhill (1960).

IV. RESULTS AND DISCUSSION

The effects of physical characteristics of windrows and environmental conditions on the drying characteristics of hay have been evaluated in three ways:

(1) comparison of drying curves obtained by plotting moisture content versus drying time

(2) comparison of time required for hay to reach a specific moisture level

(3) comparison of moisture content at selected times after cutting by analysis of variance techniques.

Comparison of the drying curves illustrates the relative drying characteristics of hay but the utility of this method is limited because the application of rigorous statistical approaches is difficult. The methods (2) and (3) listed above have an advantage in that the conventional methods of statistical analysis can be used to establish significant differences. A comparison of moisture contents at selected times after cutting is particularly useful because the hay harvesting operations are usually scheduled on the basis of moisture content of hay at a given time of day.

4.1. Physical Characteristics of Windrows

Observations on the orientation of plants in the natural windrows revealed that such windrows consisted of two distinct zones (Figure 4a). A zone of systematically arranged plants in sections 1 and 2 occupied either side of a narrow trough. The plants in these sections were placed in a nearly upright position with the heads pointing upward. Their included angles with the horizontal plane ranged from 45 to 60 degrees. These plants formed an angle of approximately 115 degrees with the direction of machine travel. The second zone consisted of some plants in random orientation in the central portion (section 3) of the windrow. The altered orientation of plants and windrow configuration after the processes of inversion and trampling are illustrated in Figures 4b and 4c, respectively.

The means and standard deviations of height, width and cross-sectional area of windrows under various treatments are shown in Tables 3, 4, 5 and 6. These values were obtained from the height and width measurements at 2-foot intervals along the windrow length. The computer programs used for these computations on an IBM system 360/75 appear in Appendix A.

The variability in cross-sectional area of natural windrows is illustrated in Figure 5. The coefficients of variability for width, height and cross-sectional area are shown in Table 7. The coefficients of variability for height and cross-sectional area of the natural windrows were found to be about 2 3/4 times greater than the corresponding value for width. There was no evidence that differences in variability exist between natural windrows and those that have been inverted or trampled. The densities of the inverted and

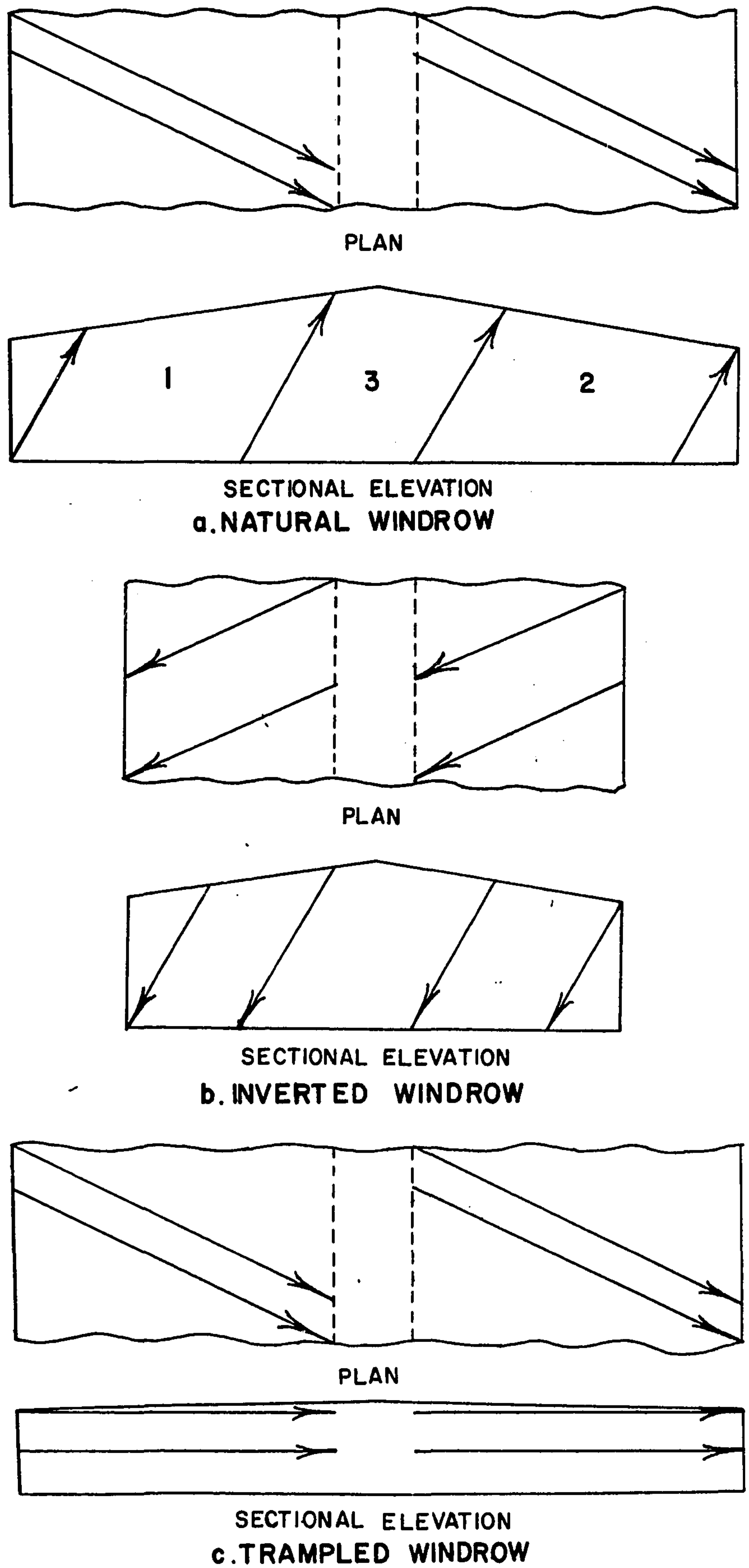


Fig. 4. Orientation of stems in the natural, inverted and trampled windrow.

TABLE 3

MEANS AND STANDARD DEVIATIONS OF WINDROW HEIGHTS

TRIAL 1

BLOCK	OBS. PER BLOCK	EDGE MEAN	EDGE S D	CENTER MEAN	CENTER S D	EQUIVALENT MEAN	EQUIVALENT S D
TREATMENT 1							
A	6	7.1	1.2	10.4	2.1	8.8	1.7
B	6	8.9	2.1	15.1	0.7	12.0	1.6
C	6	7.5	2.0	9.9	2.0	8.7	2.0
D	6	7.2	3.3	13.3	4.3	10.2	3.8
AVERAGE	24	7.7	2.3	12.2	2.6	9.9	2.5
TREATMENT 2							
A	6	8.1	1.9	10.2	2.2	9.2	2.1
B	6	9.1	1.8	9.4	1.5	9.2	1.6
C	6	6.1	2.2	8.7	2.5	7.4	2.3
D	6	7.8	3.1	8.6	1.8	8.2	2.5
AVERAGE	24	7.8	2.3	9.2	2.0	8.5	2.2
TREATMENT 3							
A	6	4.7	0.5	5.5	0.7	5.1	0.6
B	6	4.0	0.5	4.4	1.8	4.2	1.3
C	6	5.9	1.5	6.3	2.4	6.1	2.0
D	6	5.1	0.5	6.4	1.6	5.8	1.2
AVERAGE	24	4.9	0.9	5.6	1.7	5.3	1.4
TREATMENT 4							
A	6	4.2	1.2	5.8	1.1	5.0	1.2
B	6	5.3	0.6	5.0	1.1	5.1	0.9
C	6	5.0	0.6	6.4	1.0	5.7	0.8
D	6	4.2	1.0	5.7	1.3	5.0	1.2
AVERAGE	24	4.7	0.9	5.7	1.2	5.2	1.0
TREATMENT 5							
A	6	7.3	1.8	10.4	1.5	8.9	1.6
B	6	10.6	1.0	12.7	1.3	11.7	1.2
C	6	9.7	4.0	12.2	3.5	11.0	3.8
D	6	7.4	2.2	10.0	2.2	8.7	2.2
AVERAGE	24	8.8	2.5	11.3	2.3	10.1	2.4

S D = STANDARD DEVIATION

TABLE 3

MEANS AND STANDARD DEVIATIONS OF WINDROW HEIGHTS

TRIAL 1

BLOCK	OBS. PER BLOCK	HEIGHTS EDGE MEAN	EDGE S D	CENTER MEAN	CENTER S D	EQUIVALENT MEAN	EQUIVALENT S D
TREATMENT 1							
A	6	7.1	1.2	10.4	2.1	8.8	1.7
B	6	8.9	2.1	15.1	0.7	12.0	1.6
C	6	7.5	2.0	9.9	2.0	8.7	2.0
D	6	7.2	3.3	13.3	4.3	10.2	3.8
AVERAGE	24	7.7	2.3	12.2	2.6	9.9	2.5
TREATMENT 2							
A	6	8.1	1.9	10.2	2.2	9.2	2.1
B	6	9.1	1.8	9.4	1.5	9.2	1.6
C	6	6.1	2.2	8.7	2.5	7.4	2.3
D	6	7.8	3.1	8.6	1.8	8.2	2.5
AVERAGE	24	7.8	2.3	9.2	2.0	8.5	2.2
TREATMENT 3							
A	6	4.7	0.5	5.5	0.7	5.1	0.6
B	6	4.0	0.5	4.4	1.8	4.2	1.3
C	6	5.9	1.5	6.3	2.4	6.1	2.0
D	6	5.1	0.5	6.4	1.6	5.8	1.2
AVERAGE	24	4.9	0.9	5.6	1.7	5.3	1.4
TREATMENT 4							
A	6	4.2	1.2	5.8	1.1	5.0	1.2
B	6	5.3	0.6	5.0	1.1	5.1	0.9
C	6	5.0	0.6	6.4	1.0	5.7	0.8
D	6	4.2	1.0	5.7	1.3	5.0	1.2
AVERAGE	24	4.7	0.9	5.7	1.2	5.2	1.0
TREATMENT 5							
A	6	7.3	1.8	10.4	1.5	8.9	1.6
B	6	10.6	1.0	12.7	1.3	11.7	1.2
C	6	9.7	4.0	12.2	3.5	11.0	3.8
D	6	7.4	2.2	10.0	2.2	8.7	2.2
AVERAGE	24	8.8	2.5	11.3	2.3	10.1	2.4

S D = STANDARD DEVIATION

TABLE 4

MEANS AND STANDARD DEVIATIONS OF WINDROW HEIGHTS

TRIAL 2

BLOCK	OBS. PER BLOCK	HEIGHTS					
		EDGE		CENTER		EQUIVALENT	
		MEAN	S D	MEAN	S D	MEAN	S D
TREATMENT 1							
A	6	7.5	1.4	10.5	2.0	9.0	1.7
B	6	5.6	1.0	12.3	2.9	8.9	2.1
C	6	9.1	1.0	11.6	2.8	10.3	2.1
D	6	8.5	1.8	10.8	3.4	9.7	2.7
AVERAGE	24	7.7	1.3	11.3	2.8	9.5	2.2
TREATMENT 2							
A	6	9.7	2.0	11.3	2.1	10.5	2.1
B	6	6.8	0.6	8.9	2.4	7.8	1.8
C	6	7.0	1.5	10.8	2.0	8.9	1.7
D	6	9.0	2.7	10.2	2.3	9.6	2.5
AVERAGE	24	8.1	1.8	10.3	2.2	9.2	2.0
TREATMENT 3							
A	6	5.7	0.7	5.3	0.7	5.5	0.7
B	6	4.7	1.1	5.4	1.3	5.0	1.2
C	6	4.2	1.2	6.0	1.9	5.1	1.6
D	6	4.7	0.4	5.2	0.9	4.9	0.7
AVERAGE	24	4.8	0.9	5.5	1.3	5.1	1.1
TREATMENT 4							
A	6	4.8	0.7	5.6	2.2	5.2	1.6
B	6	5.6	1.0	5.1	0.8	5.3	0.9
C	6	5.4	2.0	5.6	1.3	5.5	1.7
D	6	5.1	0.9	6.2	1.2	5.6	1.1
AVERAGE	24	5.2	1.3	5.6	1.5	5.4	1.4
TREATMENT 5							
A	6	8.9	1.9	10.4	3.4	9.7	2.7
B	6	7.0	1.6	12.2	1.8	9.6	1.7
C	6	9.7	1.3	12.7	2.9	11.2	2.2
D	6	10.4	3.1	10.7	2.0	10.5	2.6
AVERAGE	24	9.0	2.1	11.5	2.6	10.2	2.4

S D = STANDARD DEVIATION

TABLE 5

MEANS AND STANDARD DEVIATIONS OF WINDROW WIDTHS

TRIAL 1.

BLOCK	OBS. PER BLOCK	TREATMENT 1 MEAN	1 S D	2 MEAN	2 S D	3 MEAN	3 S D	4 MEAN	4 S D	5 MEAN	5 S D
A	6	41.1	3.3	30.1	2.9	46.9	4.5	44.0	1.9	38.4	4.5
B	6	42.5	2.7	29.2	5.0	43.2	4.1	44.3	4.9	33.2	2.4
C	6	38.2	2.5	30.8	2.9	47.3	6.9	42.3	7.4	45.0	8.8
D	6	39.7	4.0	31.1	4.7	39.0	6.0	43.2	4.1	41.8	3.7
AVERAGE	24	40.4	3.2	30.3	4.0	44.1	5.5	43.5	5.0	39.6	5.4

TRIAL 2.

BLOCK	OBS. PER BLOCK	TREATMENT 1 MEAN	1 S D	2 MEAN	2 S D	3 MEAN	3 S D	4 MEAN	4 S D	5 MEAN	5 S D
A	6	45.3	4.5	28.7	4.0	46.8	7.1	47.8	1.9	45.2	4.7
B	6	48.5	2.9	32.7	4.5	45.5	3.4	47.0	3.5	46.3	6.0
C	6	42.7	6.1	30.5	4.5	50.7	4.0	45.7	4.2	46.2	1.7
D	6	51.7	4.8	36.8	8.2	45.2	1.9	48.7	2.3	52.3	6.9
AVERAGE	24	47.0	4.7	32.2	5.6	47.0	4.5	47.3	3.1	47.5	5.2

S D = STANDARD DEVIATION

TABLE 6

MEANS AND STANDARD DEVIATIONS OF WINDROW CROSSECTIONAL AREAS

TRIAL 1.

BLOCK	OBS. PER BLOCK	T R E A T M E N T 1		2		3		4		5	
		MEAN	S D	MEAN	S D	MEAN	S D	MEAN	S D	MEAN	S D
A	6	361.0	58.9	275.1	59.9	239.0	32.7	219.1	45.5	342.2	54.7
B	6	513.4	80.5	264.8	34.2	178.7	41.3	226.5	39.0	386.3	24.9
C	6	329.0	62.4	227.2	40.4	285.9	72.6	236.1	21.4	499.9	159.7
D	6	412.3	173.2	253.8	59.9	227.5	62.1	216.1	60.5	364.5	87.7
AVERAGE	24	403.9	104.7	255.2	49.9	232.8	54.6	224.5	43.9	398.2	95.9

TRIAL 2.

BLOCK	OBS. PER BLOCK	1 MEAN	1 S D	2 MEAN	2 S D	3 MEAN	3 S D	4 MEAN	4 S D	5 MEAN	5 S D
A	6	408.4	71.1	304.9	88.1	255.7	34.0	247.5	54.0	442.0	142.1
B	6	435.8	105.2	252.7	38.6	228.5	46.6	251.2	46.6	446.7	98.9
C	6	442.5	108.3	270.6	56.2	258.1	46.0	255.1	71.3	515.3	87.3
D	6	500.1	87.7	350.9	87.9	223.1	22.3	273.3	30.0	561.5	183.6
AVERAGE	24	446.7	94.3	294.8	71.0	241.4	38.5	256.8	52.6	491.4	133.5

S D = STANDARD DEVIATION

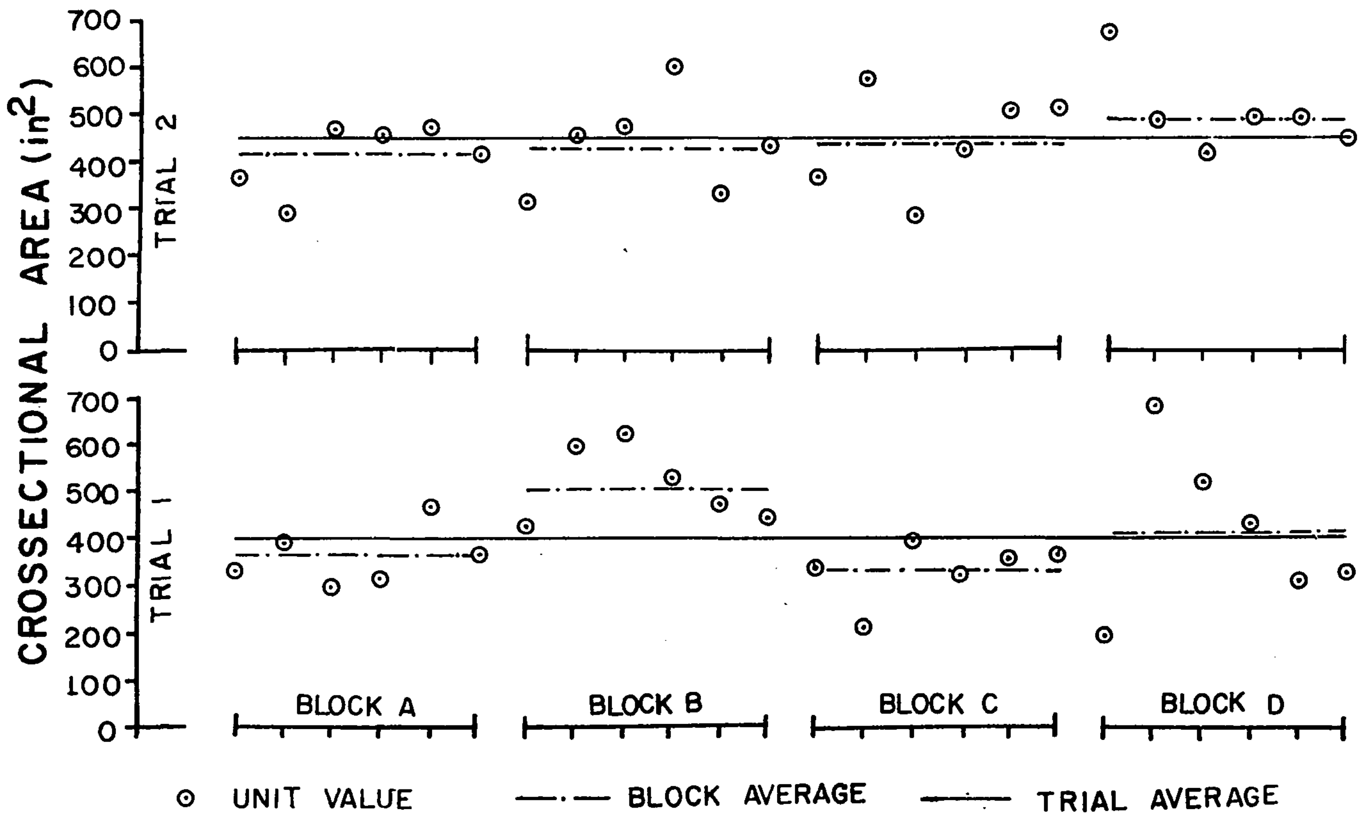


Fig. 5. Variability in computed values of cross-sectional area of the natural windrow at 2-foot intervals along the windrow length.

trampled windrows were found to be 1.5 and 1.8 times the density of the natural windrows respectively. These estimates of windrow densities were based on cross-sectional area of windrows.

TABLE 7. Coefficients of variability for width, height and cross-sectional area of windrows under various treatments

Treatment no	Trial 1			Trial 2		
	Width	Height	Cross-sectional area	Width	Height	Cross-sectional area
1	7.9	25.2	25.9	10.0	23.1	21.0
2	13.1	25.9	19.3	17.3	21.7	24.0
3	12.4	26.4	23.4	9.5	21.5	15.9
4	11.4	19.6	19.5	6.5	25.9	20.4
5	13.6	23.7	24.0	10.9	23.5	27.1

4.2. Environmental Conditions

The values of wind velocity, grass temperature by the side of the windrow, air temperature, wet bulb depression, relative humidity, and precipitation, recorded at different times of the day during the periods of the two experimental trials, are shown in Appendix B. The net solar radiation absorbed by the windrows was computed on an IBM system 360/75 using the black globe thermometer readings. The computer program and printout of results appear in Appendix C. These data illustrate variability of the environment during the drying period of hay in a typical climate of southwestern Quebec.

The wind velocity and solar radiation data have been used to study the effects of these variables on drying characteristics of hay in windrows of different configurations and stem orientations.

4.3. Drying Characteristics

4.3.1. Comparison of drying curves

The drying curves for the various treatments (Figures 6 through 13) have been developed from the moisture content data shown in Appendix D. Each point on these drying curves is an average of 8 observations obtained by taking two samples from each of the four replications of each treatment. The tables of moisture content data have been arranged according to the sampling schedule that was followed. The experimental site, date and time of each sampling are indicated in the table headings. The first sampling was made at the time of cutting. The program used for computations of moisture contents on the IBM system 360/75 computer appears in the beginning of Appendix D.

In the first experimental trial with a mixture of brome-grass and timothy, only small differences appeared between the drying rates of the natural and the inverted windrows. But after the hay was rained on, the inverted windrows dried faster than the natural windrows (Figure 6). In the second trial, using a mixture of red clover and alfalfa, the natural windrows dried faster than the inverted windrows (Figure 7).

Trampled windrows dried at a rate much lower than either natural or inverted windrows in both the trials (Figures 6 and 7). This apoears logical because the external resistance to diffusive and turbulent vapour flow through air surrounding the plant surfaces would increase as density of the bulked material increased and wind speed decreased. Because the trampled windrows were 1.8 times more dense than the natural windrows, their external resistance would be greater than that of the natural windrows. Above a given wind speed the natural windrows would be expected to dry faster than the trampled windrows.

The curve of wind speeds recorded at half-hour intervals on the experimental site was superimposed on the drying curves (Figures 8 and 9). These figures provide evidence of a steeper slope of drying curves during periods of high wind speeds. This can be attributed to decrease in external resistance with increasing wind speeds. In the windrowed material, an accumulation of vapour within the air spaces results in a decrease of plant to air vapour pressure gradients and lower rates of drying. Higher wind speeds could remove accumulated vapour from the air spaces and accelerate drying.

During the first trial wind was very calm. The average and maximum wind speeds for the three-day period were 2 and 7 mph respectively. The wind speeds were exceptionally high during the second trial and the corresponding values during this period were 5 and 16 mph.

In comparing the drying characteristics of the natural and the inverted windrows, external resistance to the vapour movement due to the influence of windrow density and wind velocity require consideration. The inverted windrows were found to have a density of 1.6 and 1.5 times the density of the natural windrows in trials 1 and 2 respectively. Direct comparisons are therefore not possible, because the slower drying in the trampled windrows shows that windrow density is an important factor influencing drying rate. The drying rate of the inverted windrows was close to that of the natural windrows in the first trial because wind speeds were very low. The increase in external resistance due to increase in density that accompanied inversion was probably much less than the high value of external resistance that prevailed due to calm wind.

In comparing results of the first and second trials for comparative drying rates in the natural and inverted windrows, differences in crop characteristics must be considered in addition to the possible differences in external resistance due to different windrow densities and air speeds in the two cases. In spite of the higher density of the inverted windrows in the first trial as compared to the second, the drying rates of the inverted windrows were closer to that of natural windrows in the first trial. The higher drying rate for the natural windrow than the inverted windrow, in the second trial may be attributed to:

(a) lower value of external resistance due to lower windrow density accompanied by high wind speed

(b) the presence of more leaves in the mixture of red clover and alfalfa than in the bromegrass and timothy mixture used in the first trial. This is in agreement with the claim of Jones and Palmer (1933) that the leaves of plants are natural agencies for disposal of plant moisture. As such, they should remain more exposed to the external drying conditions for a higher evaporation rate of the water conducted to them by the stems.

The conclusions from these findings are as follows:

(a) in wind regimes having high wind speeds, windrow density would be a critical factor influencing drying rate

(b) the relative advantage obtained from drying hay in windrows with heads pointing upward versus heads pointing downward will vary with different hay crops. In the case of hay species having a high percentage of leaves, an upright orientation of the plants with the heads pointing upward is more desirable.

Estimates of stomatal, cuticular and external resistances of clover (Shepherd, 1964) show that the drying rate of hay would increase by 200 per cent if the external resistance could be reduced to zero.

Shepherd (1965) reported a lower rate of drying of high moisture bulked material than of single units when the upper air speeds were non-limiting. This indicated some retention of external resistance by units within the bulk. The external resistance, therefore, cannot become zero, but could be reduced to a certain minimum value which will be influenced jointly by wind velocity, windrow density and possibly orientation of plants within the windrow. In natural drying of hay, very little control over wind speed is possible. It is therefore important to define the structure of an ideal windrow which will have minimum external resistance.

Shaded windrows were found to dry much slower than the unshaded windrows (Figures 10 through 13). In general the moisture differential between the shaded and unshaded windrows increased during the period between 12:00 noon and 6:00 pm when the intensity of solar radiation was highest (Figures 12 and 13). These statements are not true for the drying period following 0.38 inch rain during the first trial. The reason is that the shades remained on the shaded treatments during the period of rain and the rewetting of the hay was less in these treatments than the unshaded treatments.

The moisture differential between shaded and unshaded windrows was higher when hay was left to dry in the trampled windrows (Figures 11 and 13) compared with corresponding moisture differential in the natural windrows (Figures 10 and 12). This shows that the effect of solar radiation on the drying rate of hay in windrows depends upon windrow configuration, the results being in favour of the trampled windrows as compared with the natural windrows.

The moisture differential between shaded windrows in natural and trampled conditions (Figure 9) was found to be considerably greater than the corresponding moisture differential in unshaded windrows (Figure 8). This variability in moisture differential in the two cases confirms the earlier finding that the drying effect due to solar radiation was more pronounced in the trampled than in the natural windrows. Under shaded conditions this drying advantage of trampled windrows was controlled which resulted in a greater moisture differential compared with corresponding moisture differential in the windrows exposed to the sun.

The results showed that the amount of water evaporated (lbs/btu) from the inverted and trampled windrows was approximately 1 1/4 times greater than the corresponding moisture loss from the natural windrows (Table 8). The calculations were based on drying periods between 8:00 am and 6:00 pm for three days following cutting of the hay.

Since the surface areas of the natural windrows were approximately 1 1/4 times greater than those of the inverted and trampled windrows, this difference in the drying characteristics was not due to the lower value of net radiation on the natural windrows. However, it can be attributed to different methods of heat transfer in the two cases.

In drying with solar radiation the hay becomes warmer than the surrounding air and hay loses heat to the air. An increase in air velocity when heating by radiation decreases surface temperature of the hay, increasing the heat losses and decreasing the rate of drying. Favourable drying effects of solar radiation in the case of the trampled windrows compared with the natural windrows may be attributed to lower rates of air movement in the trampled windrows.

During the transfer of solar radiant heat from the windrow surface to the interior of the windrow, the process of conduction would be dominant in the system consisting of plants in the trampled windrows. In the case of the natural windrows, heat transfer would be controlled by convection rather than conduction. In convection drying heat moves from the air to the product. Since the hay would be at a higher temperature than the surrounding air when solar drying is prominent, convection drying does not occur.

It can be concluded from these results that solar radiation is effective in augmenting heat transfer and accelerating drying rates. Furthermore, compact windrows would be desirable to accelerate drying effects due to this environmental variable alone. It is well understood, however, that the compaction of windrows may slow down drying effects due to other climatic variables.

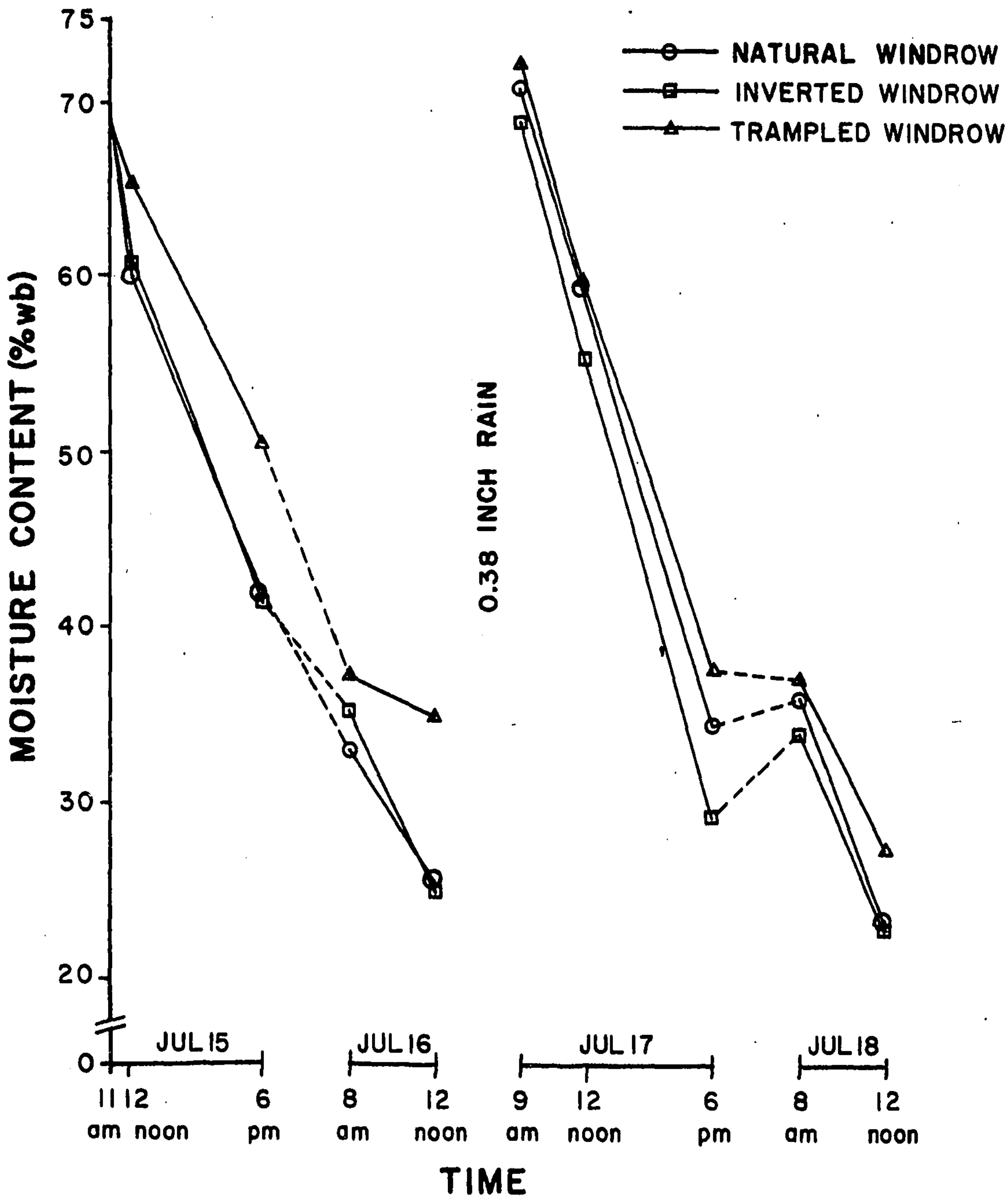


Fig. 6. Effects of stem orientation on the drying of crushed hay in windrows (Trial 1).

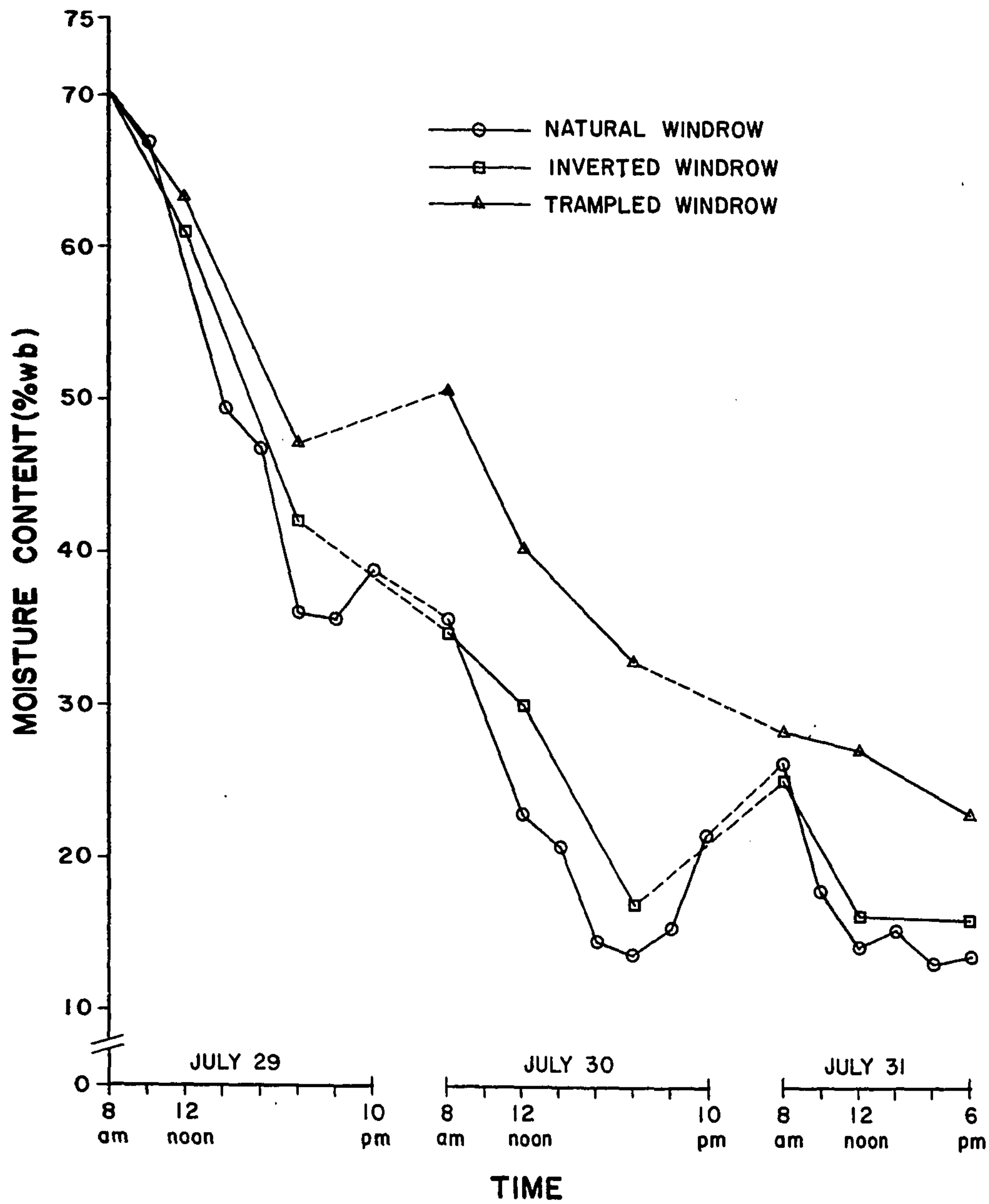


Fig. 7. Effects of stem orientation on the drying of crushed hay in windrows (Trial 2).

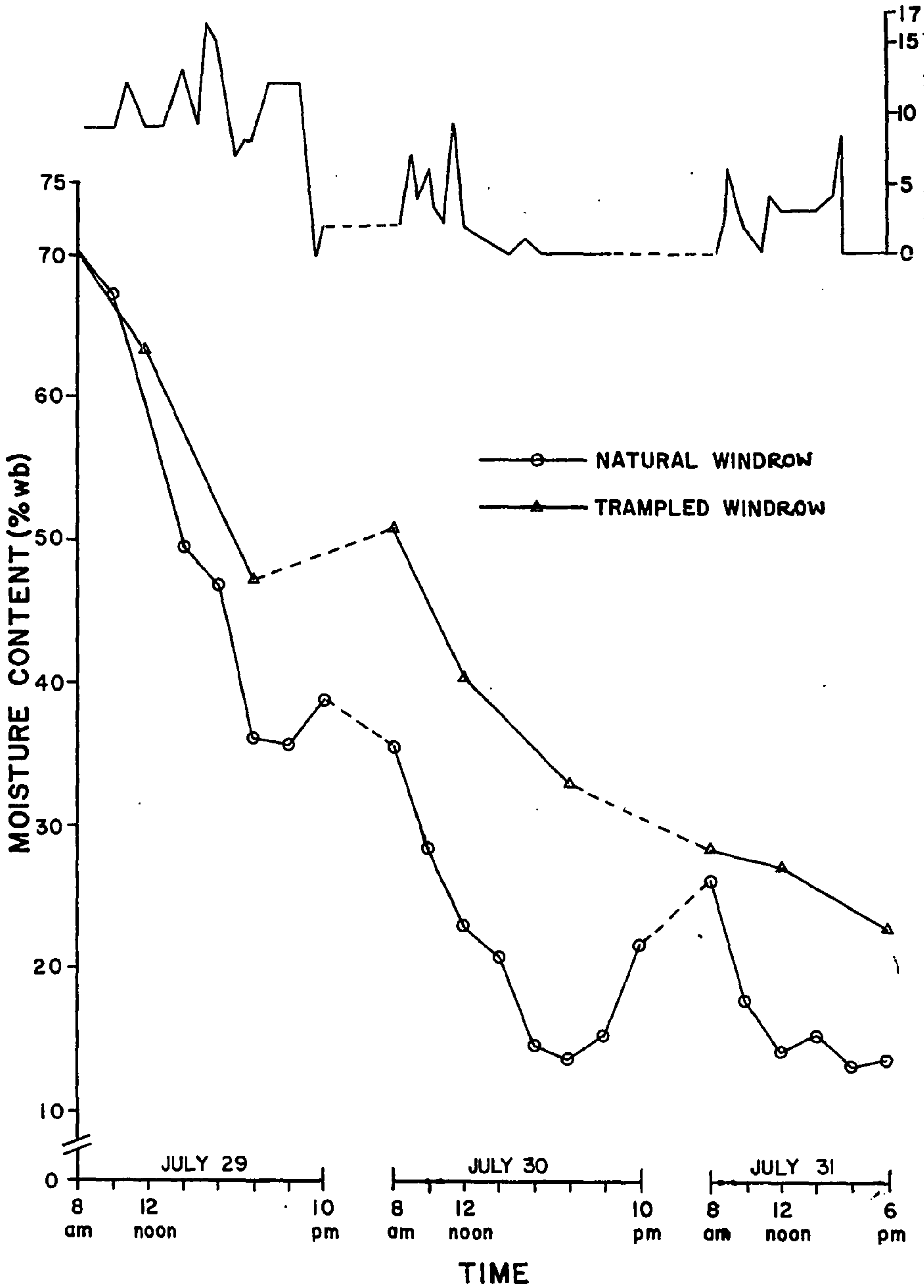


Fig. 8. Wind speed effects on drying of crushed hay in the unshaded windrows of different configurations (Trial 2).

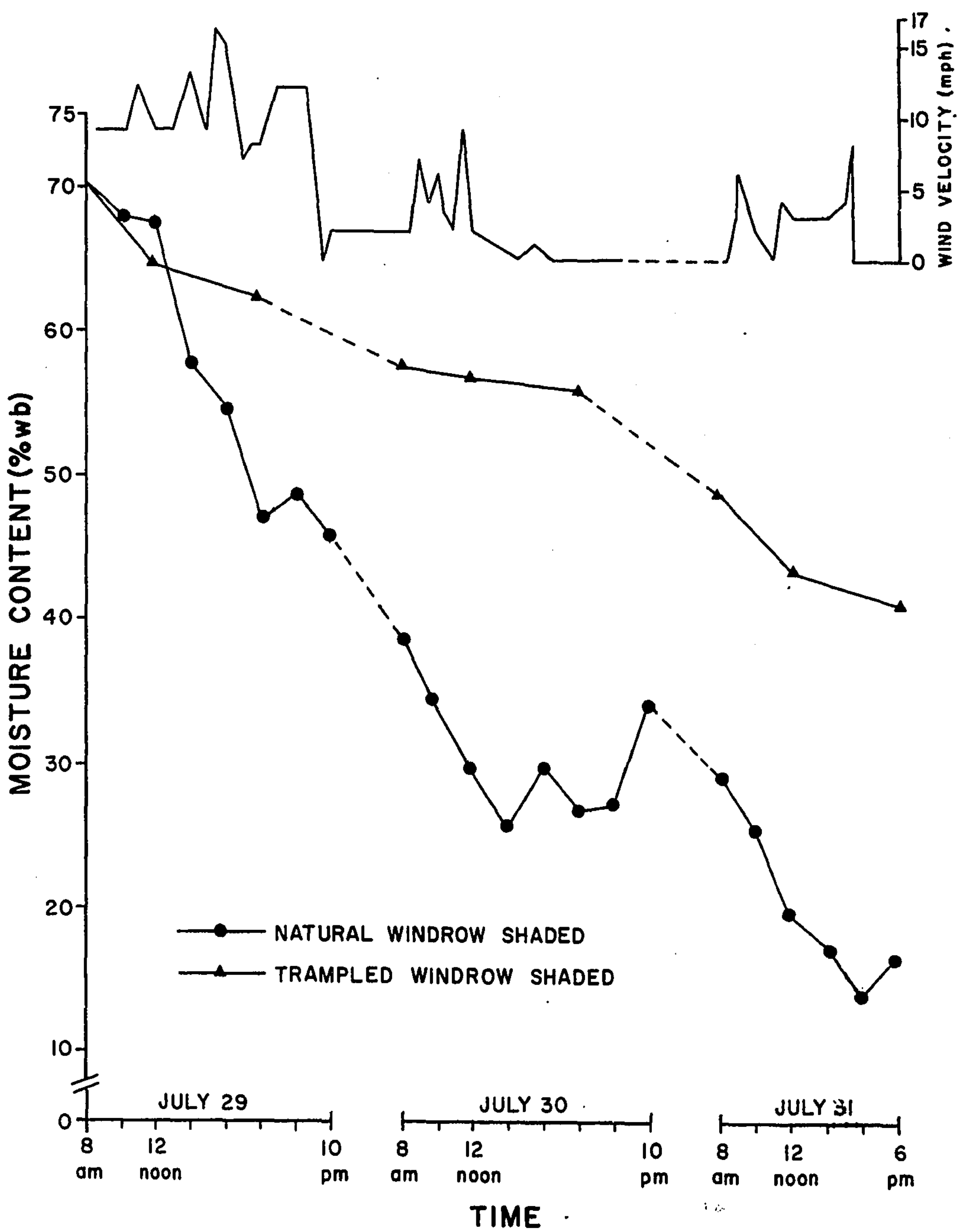


Fig. 9. Wind speed effects on drying of crushed hay in the shaded windrows of different configurations (Trial 2).

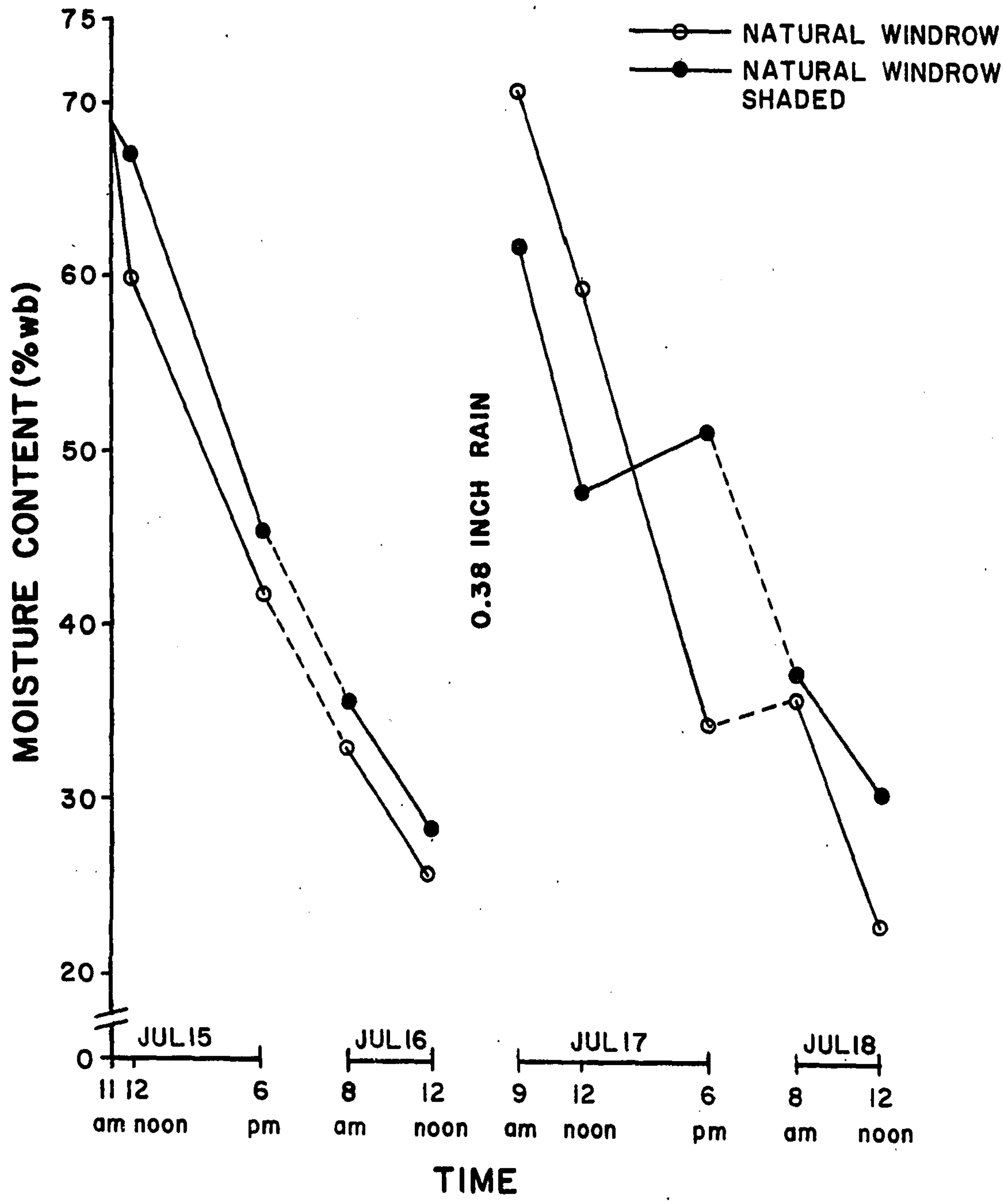


Fig. 10. Solar radiation effects on drying of crushed hay in the natural windrows (Trial 1).

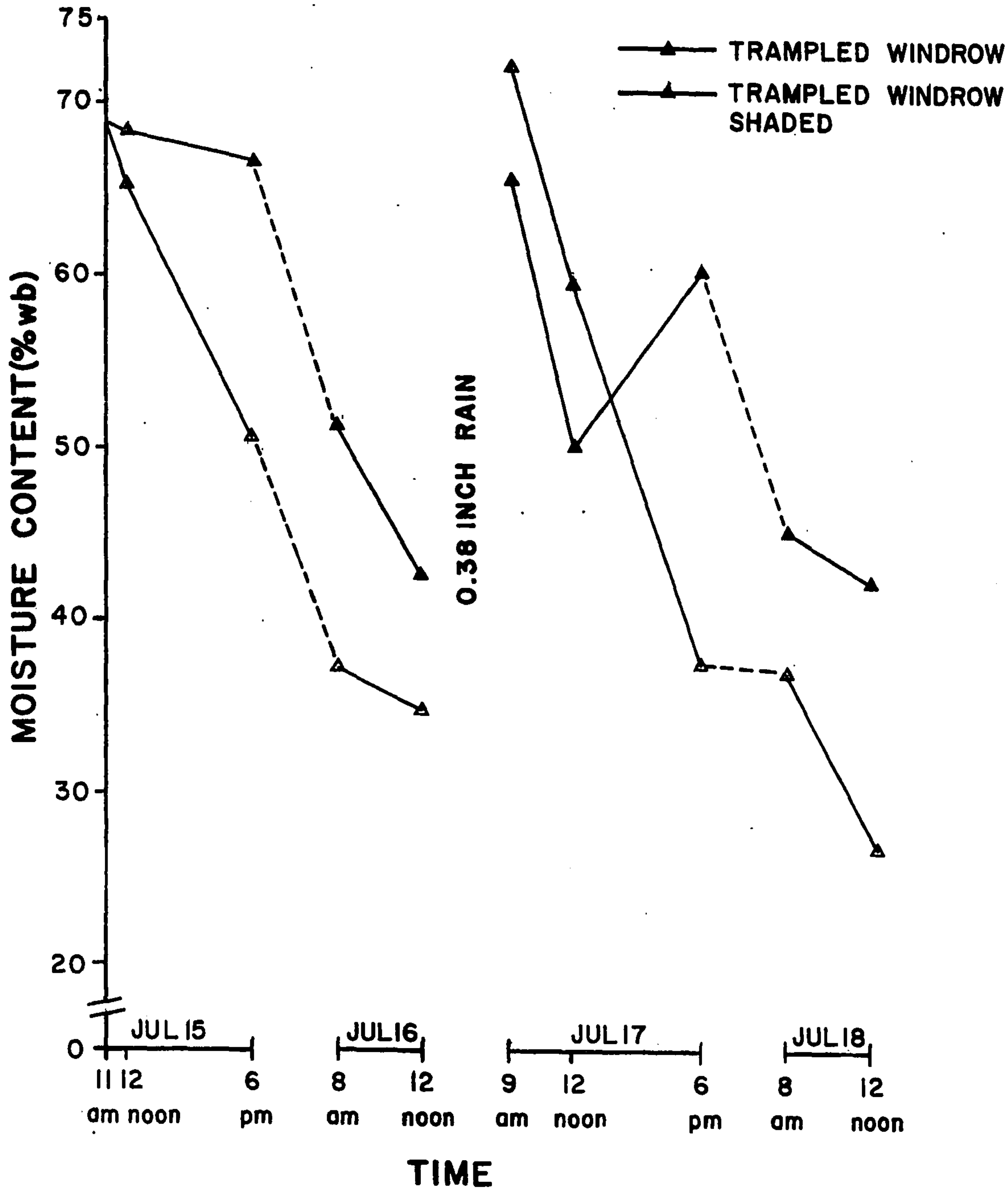


Fig. 11. Solar radiation effects on drying of crushed hay in the trampled windrows (Trial 1).

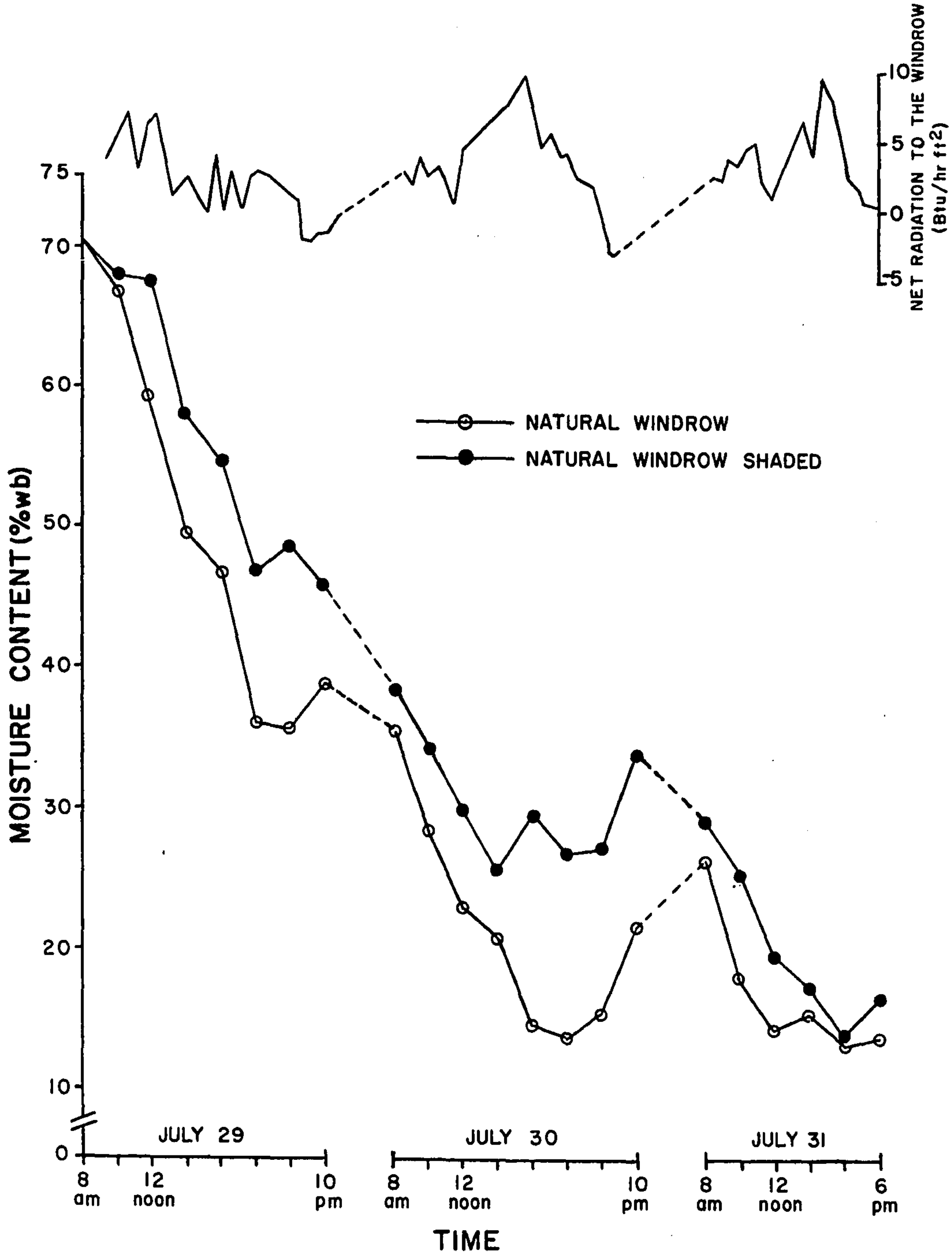


Fig. 12. Solar radiation effects on drying of crushed hay in the natural windrows (Trial 2).

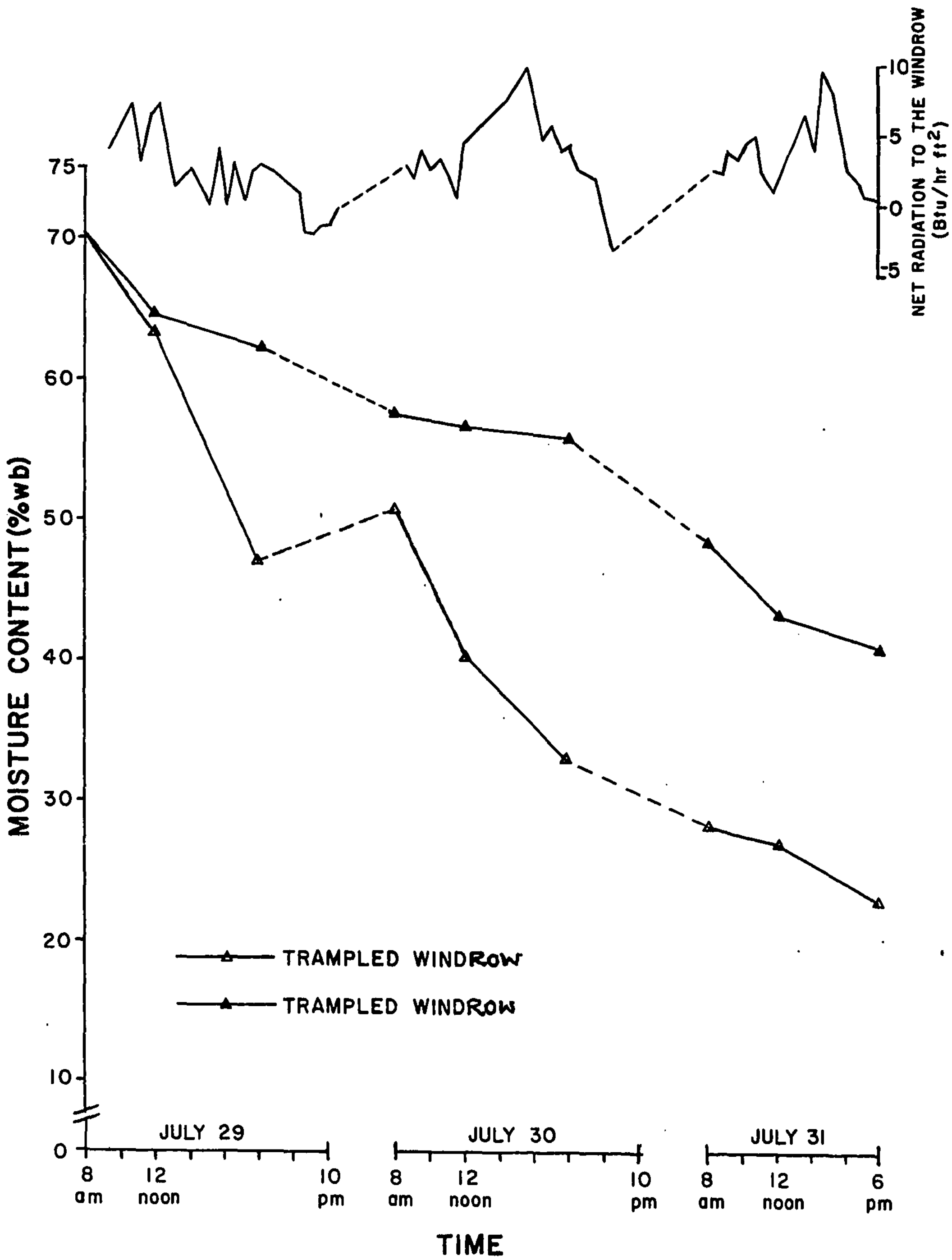


Fig.13. Solar radiation effects on drying of crushed hay in the trampled windrows (Trial 2).

TABLE 8. Effects of stem orientation on drying due to solar radiation

	Natural windrow			Inverted windrow			Trampled windrow		
	Day 1	Day 2	Day 3	Day 1	Day 2	Day 3	Day 1	Day 2	Day 3
Moisture content at 8:00 am (%wb)	70.2	35.7	26.3	70.2	34.9	25.2	70.2	50.7	28.3
Moisture content at 6:00 pm (% wb)	36.1	13.6	13.6	42.1	17.0	16.0	47.1	32.9	22.9
Weight of water evaporated (lbs)	8.82	4.23	2.43	8.02	3.56	1.81	7.22	6.11	1.16
Net radiation input (btu/ft^2)	52.30	89.24	76.92	52.30	89.24	76.22	52.30	89.24	76.22
Surface area of the windrow (ft^2)	58.62	58.62	58.62	47.10	47.10	47.10	47.05	47.05	47.05
Net radiation to the windrow (btu)	3065.82	5231.24	4509.05	2463.33	4203.20	3622.93	2460.72	4198.74	3619.09
Weight of water evaporated per day (lbs/btu)	.002880	.000808	.000539	.003256	.000847	.000499	.002934	.001455	.000320
Weight of water evaporated in three days (lbs/btu)		.004270			.004602			.004709	

Note: Calculations are based on 10-foot length of the windrow and for drying period between 8:00 am and 6:00 pm.

4.3.2. Comparison of time required for hay to reach 25 per cent moisture level

Time required for the hay windrows under various treatments to dry to 25 per cent moisture content is shown in Figure 14. In the first experimental trial, natural and inverted windrows required 25 1/2 and 25 hours respectively. The corresponding times for these same treatments in the second trial were 27 1/4 and 30 1/2 hours. The possible reason for inverted windrows to dry slightly faster in the first and considerably slower in the second trial, as compared with natural windrows, has been discussed in the section on comparison of drying curves. Natural windrow shaded and trampled windrow of trial 2 were the only other treatments that reached 25 per cent moisture level. The exposure times were 50 and 53 hours, respectively. The times represented by the broken bars could not be recorded because the windrows under these treatments did not reach 25 per cent moisture during the periods for which the experiments were conducted.

During the first trial, 0.38 inch rain fell between 5:30 pm on the second day and 8:00 am on the third day, following the morning on which the material was cut. Moisture contents of the hay after rewetting in the unshaded treatments, recorded at 9:00 am on the third day since cutting, were somewhat higher than those at the time of cutting. The corresponding moisture content recorded simultaneously for the shaded treatments was slightly lower than those at the time of cutting because the shades remained on these treatments during the period of rain and rewetting of the hay was to a lesser extent. Following the rain, only the

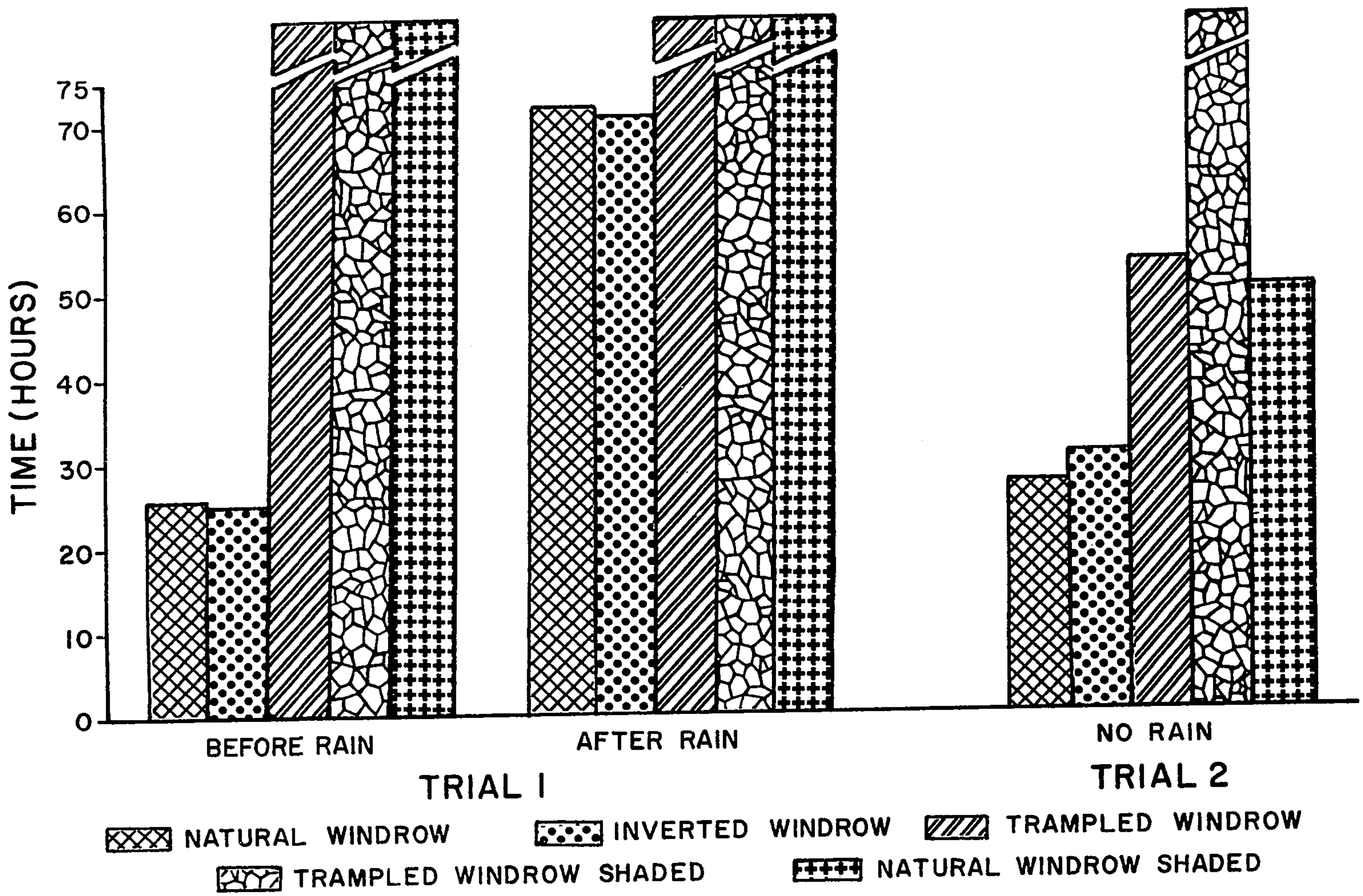


Fig. 14. Time required for crushed hay in windrows under various treatments to dry to 25 per cent moisture content (wb).

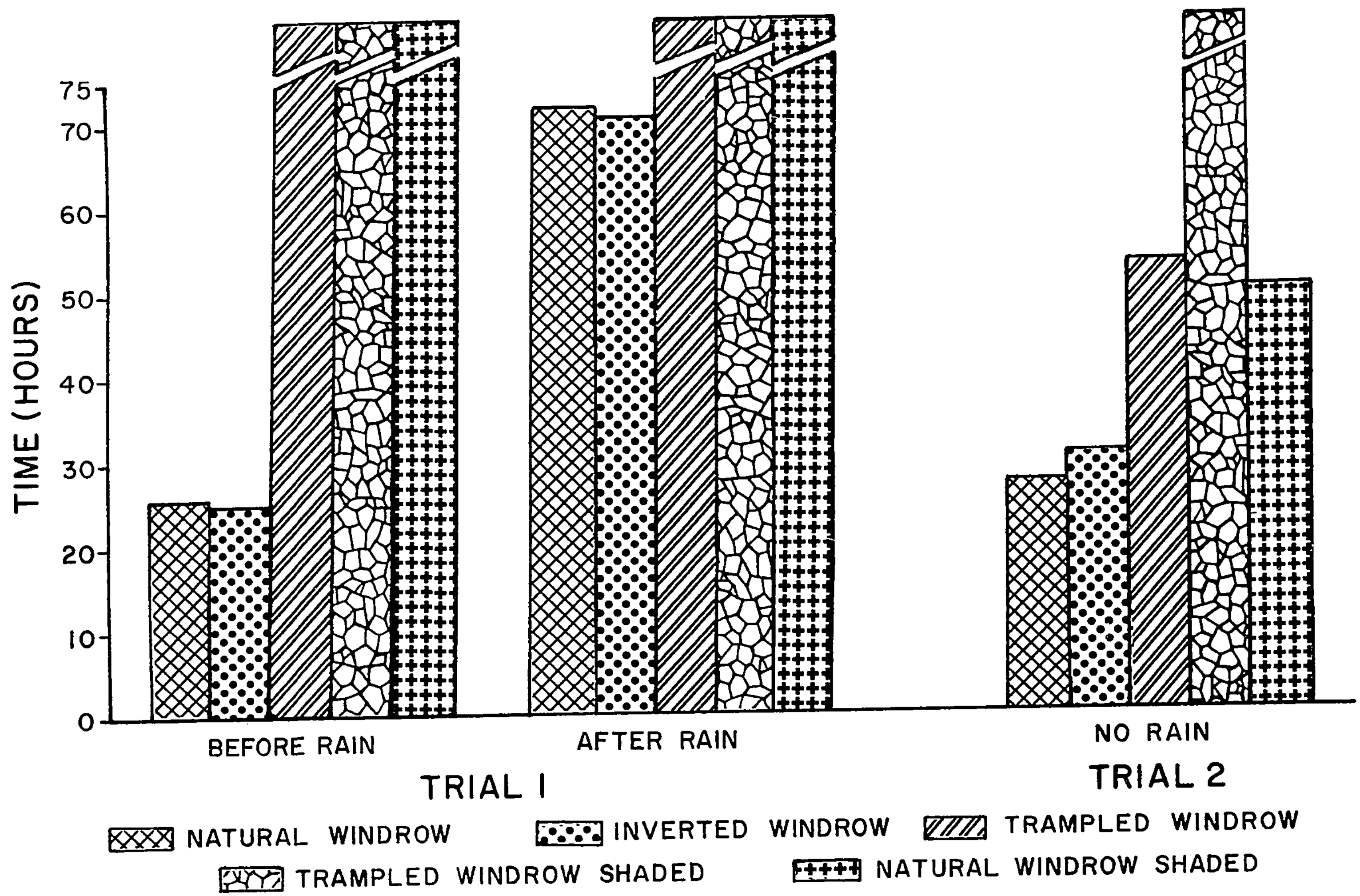


Fig. 14. Time required for crushed hay in windrows under various treatments to dry to 25 per cent moisture content (wb).

hay in the natural and the inverted windrows reached a 25 per cent moisture level within the duration of the experiment. Thus, the hay which had reached the moisture content of 25 per cent 25 hours after it was cut, could not be bailed for over 70 hours since cutting because of 0.38 inch rainfall. This single example points out the kinds of delays that may be expected when such rain showers occur during hay harvesting.

4.3.3. Comparison of moisture contents at selected times after cutting

Analysis of variance of moisture contents at 12:00 noon on the day following the morning on which the material was cut appears in Table 9. Differences in moisture content amongst treatments were highly significant and differences amongst blocks were non-significant at the 1% level in both trials. Experimental error was used as a basis for testing the hypothesis concerning the differences of moisture contents of the treatments and blocks. An analysis of variance after angular transforms of moisture content percentages (Snedecor, 1961) did not alter these conclusions.

A comparison of the treatment means, using Duncan's new multiple range test, is shown in Table 10. Any two means not underscored by the same line are significantly different from each other. The means underscored by the same line are not significantly different from each other.

TABLE 9. Analysis of variance of the moisture contents

Source of variation	df	SS	MS	F
Trial 1 - 25 hours after cutting				
Blocks	3	2.22	0.74	1.234 ns
Treatments	4	455.28	113.82	190.333 **
Experimental error	12	7.18	0.59	
Sampling error	20	31329.36	1566.46	
Trial 2 - 28 hours after cutting				
Blocks	3	1.36	0.45	0.224 ns
Treatments	4	1402.63	350.66	173.078 **
Experimental error	12	24.31	2.03	
Sampling error	20	43169.72	2158.48	

ns denotes a non-significant difference
** denotes a highly significant difference at 1% level (Steel and Torie, 1960)

TABLE 10. Comparison of the mean moisture contents of the various treatments (Duncan's new multiple range test)

Trial 1 - 25 hours after cutting

2	1	5	3	4[a]
<u>25.0</u>	<u>25.2</u>	28.2	35.2	42.6[b]

Trial 2 - 28 hours after cutting.

1	5	2	3	4
22.9	<u>29.4</u>	<u>30.0</u>	40.4	56.7

[a] These numbers refer to the treatments as listed numerically in Table 1.
[b] Moisture content (% wb).

V. SUMMARY AND CONCLUSIONS

1. The drying advantage obtained due to orientation of plants in hay windrows, with plant heads pointing upward versus downward, will vary with different species of hay crops. An upright orientation with plant heads pointing upward is desirable for faster drying of plant species having a high percentage of leaves.

2. The variability associated with configuration of windrows formed by a self-propelled windrower was found to be high. The coefficient of variability for windrow width was approximately 9 per cent and the corresponding value for height and cross-sectional area was about 2 3/4 times as great. A comparison of the calculated values of the coefficient of variability for windrow width, height and cross-sectional area, as a measure of machine performance, was not possible because data on physical characteristics of windrows were not available in the published literature.

3. The rate of drying crushed hay in windrows increased as wind velocity increased and windrow density decreased. The higher drying rate may be attributed to a lower value of external resistance to diffusive and turbulent vapour flow through air surrounding the plant surfaces under these external conditions.

4. Important changes in windrow density occur during manual handling of windrows. It was found that even in careful inversion, windrow density increased to 1 1/2 times. Since drying rate was found to decrease with increase in windrow density, the importance of eliminating operations on windrows which would cause an increase in their density becomes obvious.

5. Compact windrows are desirable to accelerate drying on account of solar radiation heat input alone. This may be attributed to lower rates of air movement in compact windrows and increased heat transfer by conduction as compared to convective heat transfer. When heating by solar radiation, increased air velocity in fluffy windrows decreases surface temperature of the hay, increasing the heat loss and decreasing the rate of drying.

VI. APPLICATION OF THE FINDINGS

Of the hay conditioners now available on the market, some place plants in windrows with heads pointing upward whereas others cause stems to stick upward. For example, the New Holland self-propelled windrower model 905 used in this study placed crushed hay plants with heads pointing upward. International Harvester (n.d.) claims in its advertising literature that its hay conditioners models 33, 34 and 2A "deposit crushed hay with stems up". Based on our finding that the drying rates obtained in these two orientations will vary with different species of hay crops, a design capable of providing any desired orientation is ideal from the standpoint of functional requirement. However, the machine design aspects of additional mechanisms and increased cost may not justify this. On the farms where a single hay crop is grown, additional features to alter stem orientation may not be required in the machine. The choice of a favourable orientation for this crop could be possible at the time of machinery selection.

The machine used in the present investigation placed stems in windrows with plant heads pointing upward. The heads were pointing inward in section 1 and outward in section 2 as shown in the plan of windrow (Figure 4a). For greater exposure of leaves to environmental conditions which is the reason for placing the plants with heads pointing upward, the plant heads in both the sections should point outward.

Placing hay in the inverse orientation with heads down and stems up shields the leaves from the sun and suppresses their drying rate compared to the drying rate of the stems. This would be desirable for reducing leaf loss. However, in this orientation the weaker part of the stem was at the bottom of the windrow. This caused the stems to bend, resulting in an apparent increase in windrow density. Since windrow density affects the drying rate of hay, these considerations are important in evaluating the relative merits of various orientations and in establishing a design criterion.

VII. RECOMMENDATIONS FOR FURTHER RESEARCH

1. Difficulties encountered with experimental methods and interpretation of results obtained emphasize the need for standardization of sampling techniques and procedures for moisture content determination. Shepherd (1957) attests to the practical difficulties associated with the variability of hay material and has suggested sampling methods. Based on a review of previous researches and results obtained from laboratory experiments, Greenhill (1960) has recommended procedures for determining moisture content of herbage. Association of Official Agricultural Chemists has established official methods for moisture content determination for several materials. Unfortunately, standard research procedures for hay have not been established yet.

2. The resistance to diffusive and turbulent vapour flow through air surrounding the plant surface slows the drying rate of windrowed hay. This resistance is influenced jointly by wind velocity, windrow density and orientation of plants in a windrow. In the field drying of hay no control over wind speeds is practical. Future research in this area should therefore be directed towards defining the structure of a windrow which is ideal for highest rate of drying.

3. Once the desired orientation of plants in windrows from the standpoint of faster drying rates is established for individual species of hay crops, estimates on leaf loss in different orientations will be required before the choice of an acceptable orientation can be made.

4. Control of environmental factors influencing the drying rate of hay is not practical in field experiments. This complicates the analysis of results. Theoretical models and controlled laboratory experiments are recommended for establishing external drying effects of environmental conditions. For example, wind tunnel studies could provide an answer to air speed effects on drying.

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APPENDICES

APPENDIX A

Programs for computing means and standard deviations of heights, widths and cross-sectional areas of windrows under five treatments, on an IBM system 360/75

```
C     DRYING HAY IN WINDROWS
C     MEANS AND STANDARD DEVIATIONS OF HEIGHTS
C     D. S. DUGGAL
      DIMENSION MAG(4)
      DATA MAG/'A','B','C','D'/
      DO 8 KPO=1,2
      WRITE(6,116)
  116 FORMAT(1H1)
      WRITE(6,1)
    1 FORMAT(  /1X,73X,'MEANS AND STANDARD DEVIATIONS OF WINDROW HEIGHTS
     1'/)
      WRITE(6,2) KPO
    2 FORMAT(1X,67X,26X,'TRIAL',I3/)
      WRITE(6,3)
    3 FORMAT(1X,67X,2X,'BLOCK',4X,'OBS.',5X,'H',5X,'E',5X,'I',5X,'G',5X,'H',5X,'
     1'H',5X,'T',5X,'S')
      WRITE(6,4)
    4 FORMAT(1X,67X,11X,'PER')
      WRITE(6,5)
    5 FORMAT(1X,67X,10X,'BLOCK')
      WRITE(6,6)
    6 FORMAT(1X,67X,22X,'EDGE',10X,'CENTER',6X,'EQUIVALENT')
      WRITE(6,7)
    7 FORMAT(1X,67X,14X,3(4X,'MEAN',4X,'S D')/)
      DO 88K=1,5
      WRITE(6,9) K
    9 FORMAT(1X,67X,'TREATMENT',I2/)
      TOTE=0.
      TOTC=0.
      TOTQ=0.
      STOTE=0.
      STOTC=0.
      STOTQ=0.
      DO 10 KOR=1,4
      COUNT=0.
      SUMSQE=0.
      SUMSQC=0.
      SUME=0.
      SUMC=0.
      SUMQ=0.
 1000 READ(5,11) JQ,EDGE,CENTER
   11 FORMAT(2X,I1,2X,10X,2F10.1)
      IF(JQ.NE.0) GO TO 35
      EQUIV=(EDGE+CENTER)/2.
      SUMSQE=SUMSQE+EDGE*EDGE
      SUMSQC=SUMSQC+CENTER*CENTER
      SUME=SUME+EDGE
      SUMC=SUMC+CENTER
      SUMQ=SUMQ+EQUIV
      COUNT=COUNT+1.
      GO TO 1000
   35 AVE=SUME/COUNT
      AVC=SUMC/COUNT
      AVQ=SUMQ/COUNT
```

```
      SDE=SQRT((SUMSQE-COUNT*AVE*AVE)/(COUNT-1.))
      SDC=SQRT((SUMSQC-COUNT*AVC*AVC)/(COUNT-1.))
      SDQ=SQRT((SDE*SDE+SDC*SDC)/2.)
      TOTE=TOTE+AVE
      TOTC=TOTC+AVC
      TOTQ=TOTQ+AVQ
      STOTE=STOTE+SDE*SDE
      STOTC=STOTC+SDC*SDC
      STOTQ=STOTQ+SDQ*SDQ
      MCOUNT=COUNT
      WRITE(6,36) MAG(KOR),MCOUNT,AVE,SDE,AVC,SDC,AVQ,SDQ
   36 FORMAT(1X,67X,4X,A1,5X,I3,1X,3(F8.1,F7.1))
      NC=KOR
   10 CONTINUE
      TOTE=TOTE/4.
      TOTC=TOTC/4.
      TOTQ=TOTQ/4.
      STDE=SQRT(STOTE/4.)
      STDC=SQRT(STOTC/4.)
      STDQ=SQRT(STOTQ/4.)
      MZZ=MCOUNT*NC
      WRITE(6,38) MZZ,TOTE,STDE,TOTC,STDC,TOTQ,STDQ
   38 FORMAT(/1X,67X,1X,'AVERAGE',1X,I4,1X,3(F8.1,F7.1)/)
   88 CONTINUE
      WRITE(6,90)
   90 FORMAT( /1X,68X,'S D = STANDARD DEVIATION')
    8 CONTINUE
      STOP
      END
```

TOTAL MEMORY REQUIREMENTS 0007DA BYTES

```
FORTRAN IV G LEVEL 1, MOD 4              MAIN                DATE = 69223          13/46/45

                C       DRYING HAY IN WINDROWS
                C       MEANS AND STANDARD DEVIATIONS OF WIDTHS
                C       D. S. DUGGAL
 0001                   DIMENSION STOT(5),TOTIME(5),MAG(4),AV(5),SD(5),SDTO(5)
 0002                   WRITE(6,118)
 0003               118 FORMAT(1H1)
 0004                   DO 115 KOS=1,23
 0005                   WRITE(6,111)
 0006               111 FORMAT(1H )
 0007               115 CONTINUE
 0008                   WRITE(6,1)
 0009                 1 FORMAT(1X ,34X,17X,'MEANS AND STANDARD DEVIATIONS OF WINDROW WIDTH
                       1S'/)
 0010                   WRITE(6,2)
 0011                 2 FORMAT(1X,34X,'TRIAL 1.'/)
 0012                   WRITE(6,3)
 0013                 3 FORMAT(1X,34X,1X,'BLOCK',5X,'OBS.',10X,'T',5X,'R',5X,'E',5X,'A',5X
                       1,'T',5X,'M',5X,'E',5X,'N',5X,'T')
 0014                   WRITE(6,4)
 0015                 4 FORMAT(1X,34X,11X,'PER')
 0016                   WRITE(6,5)
 0017                 5 FORMAT(1X,34X,10X,'BLOCK',8X,'1',12X,'2',12X,'3',12X,'4',12X,'5'/)
 0018                   WRITE(6,6)
 0019                 6 FORMAT(1X,34X,15X,5(3X,'MEAN',3X,'S D')/)
 0020                   DATA MAG/'A','B','C','D'/
 0021                   DO 31 KC=1 2
 0022                   DO 10KM=1,5
 0023                   STOT(KM)=0.
 0024                10 TOTIME(KM)=0.
 0025                   DO 32K=1,4
 0026                   DO 33L=1,5
 0027                   COUNT=0.
 0028                   SUMSQ=0.
 0029                   SUM=0.
 0030              1000 READ(5,34) JQ,WIDTH
 0031                34 FORMAT(2X,I1,2X,F10.2)
 0032                   IF(JQ.NE.0)GO TO 35
 0033                   SUMSQ=SUMSQ+WIDTH*WIDTH
 0034                   SUM=SUM+WIDTH
 0035                   COUNT=COUNT+1.
 0036                   GO TO 1000
 0037                35 AV(L)=SUM/COUNT
 0038                   SD(L)=SQRT((SUMSQ-COUNT*AV(L)*AV(L))/(COUNT-1.))
 0039                   STOT(L)=STOT(L)+SD(L)*SD(L)
 0040                   TOTIME(L)=TOTIME(L)+AV(L)
 0041                33 CONTINUE
 0042                   MCOUNT=COUNT
 0043                   WRITE(6,18)MAG(K),MCOUNT,(AV(LP),SD(LP),LP=1,5)
 0044                18 FORMAT(1X,34X,3X,A1,7X,I2,2X,5(F7.1,F6.1))
 0045                   NTO=K
 0046                32 CONTINUE
 0047                   DO 88KN=1,5
 0048                   TOTIME(KN)=TOTIME(KN)/4.
 0049                88 SDTO(KN)=SQRT(STOT(KN)/4.)
 0050                   NCO=MCOUNT*NTO
 0051                   WRITE(6,20) NCO,(TOTIME(NP),SDTO(NP),NP=1,5)
 0052                20 FORMAT(/1X,34X,    'AVERAGE',2X,I4,2X,5(F7.1,F6.1)//)
 0053                   IF(KC.EQ.2)GO TO 31
 0054                   WRITE(6,44)
 0055                44 FORMAT(1X,34X,'TRIAL 2.'/)
 0056                31 CONTINUE
 0057                   WRITE(6,89)
 0058                89 FORMAT(  //35X,'S D = STANDARD DEVIATION')
 0059                   STOP
 0060                   END

   TOTAL MEMORY REQUIREMENTS 000706 BYTES
```

```
      C      DRYING HAY IN WINDROWS
      C      MEANS AND STANDARD DEVIATIONS OF CROSSECTIONAL AREAS
      C      D. S. DUGGAL
             DIMENSION STOT(5),TOTIME(5),MAG(4),AV(5),SD(5),SDTO(5)
             WRITE(6,118)
         118 FORMAT(1H1)
             DO 115 KOS=1,23
             WRITE(6,111)
         111 FORMAT(1H )
         115 CONTINUE
             WRITE(6,1)
           1 FORMAT(1X ,34X,10X,'MEANS AND STANDARD DEVIATIONS OF WINDROW CROSS
            1ECTIONAL AREAS'/)
             WRITE(6,2)
           2 FORMAT(1X,34X,'TRIAL 1.'/)
             WRITE(6,3)
           3 FORMAT(1X,34X,1X,'BLOCK',5X,'OBS.',10X,'T',5X,'R',5X,'E',5X,'A',5X
            1,'T',5X,'M',5X,'E',5X,'N',5X,'T')
             WRITE(6,4)
           4 FORMAT(1X,34X,11X,'PER')
             WRITE(6,5)
           5 FORMAT(1X,34X,10X,'BLOCK',8X,'1',12X,'2',12X,'3',12X,'4',12X,'5'/)
             WRITE(6,6)
           6 FORMAT(1X,34X,15X,5(3X,'MEAN',3X,'S D')/)
             DATA MAG/'A','B','C','D'/
             DO 31 KC=1,2
             DO 10KM=1,5
             STOT(KM)=0.
          10 TOTIME(KM)=0.
             DO 32K=1,4
             DO 33L=1,5
             COUNT=0.
             SUMSQ=0.
             SUM=0.
        1000 READ(5,34) JQ,WIDTH,EDGE,CENTER
          34 FORMAT(2X,I1,2X,F10.2,2F10.1)
             IF(JQ.NE.0)GO TO 35
             ABB=(EDGE+CENTER)/2.
             CROS=WIDTH*ABB
             SUMSQ=SUMSQ+CROS*CROS
             SUM=SUM+CROS
             COUNT=COUNT+1.
             GO TO 1000
          35 AV(L)=SUM/COUNT
             SD(L)=SQRT((SUMSQ-COUNT*AV(L)*AV(L))/(COUNT-1.))
             STOT(L)=STOT(L)+SD(L)*SD(L)
             TOTIME(L)=TOTIME(L)+AV(L)
          33 CONTINUE
             MCOUNT=COUNT
             WRITE(6,18)MAG(K),MCOUNT,(AV(LP),SD(LP),LP=1,5)
          18 FORMAT(1X,34X,3X,A1,7X,I2,2X,5(F7.1,F6.1))
             NTO=K
          32 CONTINUE
             DO 88KN=1,5
             TOTIME(KN)=TOTIME(KN)/4.
          88 SDTO(KN)=SQRT(STOT(KN)/4.)
             NCO=MCOUNT*NTO
             WRITE(6,20) NCO,(TOTIME(NP),SDTO(NP),NP=1,5)
          20 FORMAT(/1X,34X,    'AVERAGE',2X,I4,2X,5(F7.1,F6.1)//)
             IF(KC.EQ.2)GO TO 31
             WRITE(6,44)
          44 FORMAT(1X,34X,'TRIAL 2.'/)
          31 CONTINUE
             WRITE(6,89)
          89 FORMAT(  //35X,'S D = STANDARD DEVIATION')
             STOP
             END
```

TOTAL MEMORY REQUIREMENTS 000756 BYTES

APPENDIX B

Climatological data recorded at the test site during the period of the experimental trials

CLIMATOLOGICAL DATA

July 15-18 1968

Date and time	Wind velocity m.p.h.	Minimum grass temp. °F.	Dry bulb temp. °F.	Wet bulb temp. °F.	Wet bulb depression °F.	Relative humidity %
July 15						
am 8:00	0	63.0	76.0	73.0		87.5
10:00	2	74.0	82.0	76.0		77.0
July 16						
am 9:00	2		80.0	76.0	4.0	83.0
11:00	2	84.0	86.0	79.0	7.0	73.5
pm 1:00	7	100.0	87.5	80.0	7.5	72.5
3:00	5		89.5	80.5	9.0	67.5
5:00	0	87.0	91.0	82.0	9.0	68.0
5:30*						
7:00	0		80.0	77.0	3.0	87.0
July 17						
am 9:00	0	75.0	79.0	76.0	3.0	87.0
11:00	0	75.0	84.0	77.0	7.0	73.0
pm 1:00	0	97.0	80.5	77.5	3.0	87.5
3:00	1	101.0	86.0	79.0	7.0	73.5
5:00	0	89.0	88.0	79.0	9.0	67.5
July 18						
am 9:00	0	80.0	82.0	78.0	4.0	82.5
11:00	4	85.0	86.0	79.0	7.0	73.5
pm 1:00	2	86.0	85.0	79.0	6.0	76.5

*0.38 in. rain

CLIMATOLOGICAL DATA

July 29-31 1968

Date and time	Wind velocity m.p.h.	Minimum grass temp. °F.	Dry bulb temp. °F.	Wet bulb temp. °F.	Wet bulb depression °F.	Relative humidity %
July 29						
am 8:30	9		59.0	55.0		77.0
10:30	9		63.0	58.0	5.0	74.0
11:00	12		62.0	58.0	4.0	79.0
11:30	11		68.0	60.0	8.0	63.0
noon 12:00	9		70.0	63.0	7.0	68.0
pm 1:00	9		63.0	58.0	5.0	74.0
2:00	13	71.0	70.0	61.0	9.0	60.0
2:30	11	67.5	63.0	57.0	6.0	70.0
3:00	9	78.0	66.0	56.0	10.0	54.0
3:30	16	77.0	78.0	68.0	10.0	60.0
4:00	15	76.0	62.0	55.0	7.0	64.0
4:30	12	80.0	68.0	58.0	10.0	55.0
5:00	7	82.0	68.0	58.0	10.0	55.0
5:30	8	74.0	62.0	56.0	6.0	69.0
6:00	8	80.0	61.0	58.0	3.0	83.0
7:00	12	67.0	63.0	55.5	7.5	62.0
7:30		60.0				
8:00	12		60.0	53.0	7.0	63.0
8:30	12		56.0	51.0	5.0	71.0
9:00	6		56.0	51.5	4.5	73.0
9:30	0	56.0	53.0	52.0	1.0	93.0
10:00	2	54.0	53.0	51.0	2.0	87.0
10:30	2	52.0	53.0	50.0	3.0	82.0
July 30						
am 8:30	2	59.0	58.0	54.0	4.0	78.0
9:00	7	64.0	59.0	56.0	3.0	83.0
9:30	4	76.0	66.0	58.0	8.0	62.0
10:00	6	80.0	68.0	62.0	6.0	72.0
10:30	3	82.0	68.0	60.0	8.0	63.0
11:00	2	86.0	70.0	60.0	10.0	56.0
11:30	9	90.0	72.0	63.0	7.0	61.0
noon 12:00	2	95.0	70.0	60.0	10.0	56.0
pm 2:30	0	100.0	79.0	67.0	12.0	54.0
3:00		100.0				
3:30	1	98.0	79.0	69.0	10.0	61.0
4:00		95.0				
4:30	0	95.0	75.0	61.0	14.0	45.5

(continued)

CLIMATOLOGICAL DATA

July 29-31 1968

(continued)

Date and time	Wind velocity m.p.h.	Minimum grass temp. °F.	Dry bulb temp. °F.	Wet bulb temp. °F.	Wet bulb depression °F.	Relative humidity %
July 30 (continued)						
pm 5:00	0		80.0	63.0	17.0	38.0
5:30	0		72.0	60.0	12.0	50.0
6:00	0		72.0	60.0	12.0	50.0
6:30	0	76.0	70.0	58.0	12.0	48.0
7:30	0	56.0	79.0	61.0	18.0	35.0
8:00	0	52.0	63.0	58.0	5.0	74.0
8:30	0	48.0	54.0	54.0	0.0	100.0
July 31						
am 7:30		60.0				
8:30	0		65.0	62.0	3.0	85.0
9:00	3	82.0	72.0	61.0	11.0	53.0
9:30	6	88.0	74.0	66.0	8.0	66.0
10:00	3	84.0	78.0	69.0	9.0	63.0
10:30	1	101.0	79.0	71.0	8.0	68.0
11:00	0	88.0	86.0	74.0	12.0	57.0
11:30	4	82.0	79.0	70.0	9.0	64.0
noon 12:00	3	81.0	77.0	70.0	7.0	71.0
pm 2:00	3	90.0	83.0	75.0	8.0	69.0
2:30	4	88.0	85.0	74.0	11.0	60.0
3:00	8	90.0	87.0	75.0	12.0	57.0
3:30	0	98.0	94.0	82.0	6.0	61.0
4:30	0	98.0	83.0	73.0	10.0	62.0
5:00	0	90.0	86.0	73.0	13.0	54.0
5:15	0		83.0	75.0	8.0	69.0
6:00	0	80.0	79.0	71.0	8.0	68.0

APPENDIX C

Computer program and printout of radiation results computed on an IBM system 360/75 from data recorded at the experimental site

```
            C      DRYING HAY IN WINDROWS
            C      NET RADIATION TO WINDROW
            C      D.S.DUGGAL
 0001              DIMENSION MAP(40),MIT(40),MTIME(4)
 0002              RA=9./5.
 0003              EM=0.173E-08
 0004       6      READ(5,1,END=88) MAP
 0005            1 FORMAT(40A2)
 0006              WRITE(6,112)
 0007       112    FORMAT(1H1)
 0008              DO 200 I=1,2
 0009          200 WRITE(6,111)
 0010       111    FORMAT(1H )
 0011              PRINT7
 0012       7      FORMAT(1H ,64X,19X,27HR A D I A T I O N   D A T A)
 0013              PRINT8,(MAP(I),I=1,8)
 0014            8 FORMAT(1X,64X,25X,8A2//)
 0015              PRINT9
 0016            9 FORMAT(1X,64X,3X,4HTIME,2X,4HWIND,3X,31HT   E   M   P   E   R   A   T   U
                  1 R  E,7X,7HRADIANT)
 0017              PRINT10
 0018           10 FORMAT(1X,64X,9X,4HVEL.,40X,9HHEAT LOAD)
 0019              PRINT11
 0020           11 FORMAT(1X,64X,10X,3HFPS,18X,1HF,19X,12HBTU/HR FT**2)
 0021              PRINT12
 0022           12 FORMAT(1X,64X,16X,5HGLOBE,1X,6HSHIELD,2X,5HGLOBE,1X,6HSHIELD,1X,5H
                  1GLOBE,4X,2HTO,1X,4HFROM,3X,3HNET)
 0023              PRINT13
 0024           13 FORMAT(1X,64X,14X,4(1X,6HFACING),2X,4HFROM,2X,4HWIN-,1X,4HWIN-)
 0025              PRINT14
 0026           14 FORMAT(1X,64X,18X,3HSUN,4X,3HSUN,2(1X,6HGROUND),2X,4HAMB.,2X,4HDRO
                  1W,1X,4HDROW)
 0027           26 READ20,MIT
 0028           20 FORMAT(40A2)
 0029              PRINT15,MIT
 0030       15     FORMAT(1X,64X,30A2)
 0031           24 READ16,VEL,(MTIME(I),I=1,4),BSUN,SHSUN,BG,SG,JQ
 0032           16 FORMAT(F5.0,2X,4A2,4F5.1,44X,I1)
 0033              IF(JQ-1)17,18,6
 0034           17 IF(VEL)21,21,22
 0035           21 FACT=0.
 0036              IMVEL=0
 0037              GO TO 29
 0038           22 SO=VEL*1.4667
 0039              FACT=0.232*SQRT (SO)
 0040              IMVEL=SO
 0041           29 TG1=BSUN*RA+32.
 0042              TA1=SHSUN*RA+32.
 0043              TG2=BG*RA+32.
 0044              TA2=SG*RA+32.
 0045              RHLT=FACT*(TG1-TA1)+EM*(460.+TG1)**4
 0046              RHLF=FACT*(TG2-TA2)+EM*(460.+TG2)**4
 0047              TNET=RHLT-RHLF
 0048              AMB=TG1-TA1
 0049              PRINT23,(MTIME(I),I=1,4),IMVEL,TG1,TA1,TG2,TA2,AMB,RHLT,RHLF,
                  1TNET
 0050           23 FORMAT(1X,64X,4A2,I5,F8.1,3F7.1,2F6.1,2F6.1)
 0051              GO TO 24
 0052           18 PRINT25
 0053           25 FORMAT(1H )
 0054              GO TO 26
 0055           88 CALL EXIT
 0056              END

  TOTAL MEMORY REQUIREMENTS 0008A6 BYTES
```

RADIATION DATA
JULY 29-30 1968

TIME	WIND VEL. FPS	TEMPERATURE F: GLOBE FACING SUN	SHIELD FACING SUN	GLOBE FACING GROUND	SHIELD FACING GROUND	GLOBE FROM AMB.	RADIANT HEAT LOAD BTU/HR FT**2: TO WIN-DROW	FROM WIN-DROW	NET
JULY 29									
AM 9.30	13	62.6	60.8	59.5	59.0	1.8	130.6	126.5	4.1
10.30	13	67.1	63.0	62.4	60.8	4.1	137.0	130.2	6.8
11.00	17	59.5	58.5	58.1	58.3	1.1	127.1	124.5	2.6
11.30	16	66.6	63.7	62.6	61.7	2.9	135.7	129.9	5.8
NOON 12	13	69.1	65.7	64.4	63.5	3.4	138.4	131.6	6.9
PM 1.00	13	69.8	71.6	67.6	68.0	-1.8	134.8	133.8	1.0
2.00	19	70.7	72.0	68.0	68.9	-1.3	136.0	133.5	2.4
2.30	16	61.7	61.3	61.2	61.2	0.4	128.5	127.6	0.9
3.00	13	64.4	65.1	64.2	64.4	-0.7	130.2	130.5	-0.3
3.30	23	69.8	69.8	67.1	68.0	0.0	136.3	132.5	3.8
4.00	22	60.8	60.8	60.8	60.6	0.0	127.3	127.5	-0.2
4.30	17	68.0	68.0	65.8	66.4	0.0	134.5	131.7	2.7
5.00	10	62.2	62.2	62.2	62.2	0.0	128.7	128.7	0.0
5.30	11	65.3	65.3	63.1	63.5	0.0	131.7	129.3	2.4
6.00	11	62.2	62.2	59.9	60.4	0.0	128.7	126.0	2.7
7.00	17	62.6	61.5	61.5	61.5	1.1	130.1	128.0	2.1
8.13	17	58.6	58.1	58.3	58.1	0.5	125.7	125.0	0.7
8.35	17	54.0	54.3	55.4	54.9	-0.4	120.4	122.6	-2.2
8.52	8	53.6	53.6	55.0	53.6	0.0	120.4	122.7	-2.3
9.30	0	51.1	52.0	53.1	52.3	-0.9	118.0	119.9	-1.8
10.00	2	51.8	52.0	53.2	52.3	-0.2	118.6	120.4	-1.8
10.30	2	49.8	49.8	50.2	50.0	0.0	116.9	117.3	-0.4
JULY 30									
AM 8.30	2	57.2	59.2	53.6	54.1	-2.0	123.0	120.2	2.8
9.00	10	59.0	61.3	55.4	55.8	-2.3	123.8	121.8	2.0
9.30	5	62.2	64.4	57.6	58.6	-2.2	127.5	123.5	3.9
10.00	8	63.9	67.6	59.9	61.7	-3.8	127.7	125.2	2.5
10.30	4	64.4	64.4	60.8	60.3	0.0	130.8	127.5	3.3
11.00	2	68.4	74.7	64.4	66.2	-6.3	132.3	130.1	2.2
11.30	13	66.2	69.8	63.7	64.9	-3.6	129.6	129.0	0.6
NOON 12	2	71.6	74.5	66.7	68.4	-2.9	137.0	132.5	4.5
PM 2.30	0	78.8	74.8	71.6	71.6	4.0	145.8	138.2	7.6
3.30	1	79.7	76.5	71.8	73.4	3.2	147.7	137.9	9.8
4.30	0	73.8	74.7	69.3	70.7	-0.9	140.4	135.7	4.7
5.00	0	76.1	75.2	70.7	72.5	0.9	142.9	137.2	5.7
5.30	0	72.0	70.7	68.2	68.9	1.3	138.5	134.6	3.9
6.00	0	71.8	70.2	67.6	68.5	1.6	138.3	134.1	4.3
6.30	0	70.3	68.5	67.8	68.0	1.8	136.9	134.3	2.6
7.30	0	68.0	65.5	66.0	66.2	2.5	134.5	132.5	2.0
8.00	0	60.1	57.6	60.8	58.6	2.5	126.6	127.3	-0.7
8.30	0	49.1	50.0	52.5	51.4	-0.9	116.2	119.4	-3.2

RADIATION DATA
JULY 29-30 1968

TIME	WIND VEL. FPS	TEMPERATURE F GLOBE FACING SUN	SHIELD FACING SUN	GLOBE FACING GROUND	SHIELD FACING GROUND	GLOBE FROM AMB.	RADIANT HEAT LOAD BTU/HR FT**2 TO WIN-DROW	FROM WIN-DROW	NET
JULY 29									
AM 9.30	13	62.6	60.8	59.5	59.0	1.8	130.6	126.5	4.1
10.30	13	67.1	63.0	62.4	60.8	4.1	137.0	130.2	6.8
11.00	17	59.5	58.5	58.1	58.3	1.1	127.1	124.5	2.6
11.30	16	66.6	63.7	62.6	61.7	2.9	135.7	129.9	5.8
NOON 12	13	69.1	65.7	64.4	63.5	3.4	138.4	131.6	6.9
PM 1.00	13	69.8	71.6	67.6	68.0	-1.8	134.8	133.8	1.0
2.00	19	70.7	72.0	68.0	68.9	-1.3	136.0	133.5	2.4
2.30	16	61.7	61.3	61.2	61.2	0.4	128.5	127.6	0.9
3.00	13	64.4	65.1	64.2	64.4	-0.7	130.2	130.5	-0.3
3.30	23	69.8	69.8	67.1	68.0	0.0	136.3	132.5	3.8
4.00	22	60.8	60.8	60.8	60.6	0.0	127.3	127.5	-0.2
4.30	17	68.0	68.0	65.8	66.4	0.0	134.5	131.7	2.7
5.00	10	62.2	62.2	62.2	62.2	0.0	128.7	128.7	0.0
5.30	11	65.3	65.3	63.1	63.5	0.0	131.7	129.3	2.4
6.00	11	62.2	62.2	59.9	60.4	0.0	128.7	126.0	2.7
7.00	17	62.6	61.5	61.5	61.5	1.1	130.1	128.0	2.1
8.13	17	58.6	58.1	58.3	58.1	0.5	125.7	125.0	0.7
8.35	17	54.0	54.3	55.4	54.9	-0.4	120.4	122.6	-2.2
8.52	8	53.6	53.6	55.0	53.6	0.0	120.4	122.7	-2.3
9.30	0	51.1	52.0	53.1	52.3	-0.9	118.0	119.9	-1.8
10.00	2	51.8	52.0	53.2	52.3	-0.2	118.6	120.4	-1.8
10.30	2	49.8	49.8	50.2	50.0	0.0	116.9	117.3	-0.4
JULY 30									
AM 8.30	2	57.2	59.2	53.6	54.1	-2.0	123.0	120.2	2.8
9.00	10	59.0	61.3	55.4	55.8	-2.3	123.8	121.8	2.0
9.30	5	62.2	64.4	57.6	58.6	-2.2	127.5	123.5	3.9
10.00	8	63.9	67.6	59.9	61.7	-3.8	127.7	125.2	2.5
10.30	4	64.4	64.4	60.8	60.3	0.0	130.8	127.5	3.3
11.00	2	68.4	74.7	64.4	66.2	-6.3	132.3	130.1	2.2
11.30	13	66.2	69.8	63.7	64.9	-3.6	129.6	129.0	0.6
NOON 12	2	71.6	74.5	66.7	68.4	-2.9	137.0	132.5	4.5
PM 2.30	0	78.8	74.8	71.6	71.6	4.0	145.8	138.2	7.6
3.30	1	79.7	76.5	71.8	73.4	3.2	147.7	137.9	9.8
4.30	0	73.8	74.7	69.3	70.7	-0.9	140.4	135.7	4.7
5.00	0	76.1	75.2	70.7	72.5	0.9	142.9	137.2	5.7
5.30	0	72.0	70.7	68.2	68.9	1.3	138.5	134.6	3.9
6.00	0	71.8	70.2	67.6	68.5	1.6	138.3	134.1	4.3
6.30	0	70.3	68.5	67.8	68.0	1.8	136.9	134.3	2.6
7.30	0	68.0	65.5	66.0	66.2	2.5	134.5	132.5	2.0
8.00	0	60.1	57.6	60.8	58.6	2.5	126.6	127.3	-0.7
8.30	0	49.1	50.0	52.5	51.4	-0.9	116.2	119.4	-3.2

RADIATION DATA
JULY 31 1968

TIME	WIND VEL. FPS	TEMPERATURE F GLOBE FACING SUN	SHIELD FACING SUN	GLOBE FACING GROUND	SHIELD FACING GROUND	GLOBE FROM AMB.	RADIANT HEAT LOAD BTU/HR FT**2 TO WIN-DROW	FROM WIN-DROW	NET
JULY 31									
AM 8.30	0	66.2	66.2	63.5	64.4	0.0	132.6	129.9	2.7
9.00	4	70.3	71.6	67.6	68.4	-1.3	136.2	133.7	2.5
9.30	8	71.8	72.1	68.4	69.4	-0.4	138.1	134.1	4.0
10.00	4	75.0	76.6	71.6	73.0	-1.6	141.0	137.5	3.5
10.30	1	78.6	79.7	74.3	75.6	-1.1	145.3	140.6	4.7
11.00	0	81.9	81.0	77.0	77.5	0.9	149.1	143.9	5.3
11.30	5	76.5	75.6	74.7	74.5	0.9	143.8	141.5	2.3
NOON 12	4	74.3	74.3	73.4	73.8	0.0	141.0	139.9	1.1
PM 2.00	4	81.5	79.2	77.0	78.8	2.3	149.9	143.0	6.9
2.30	5	82.0	80.6	78.8	78.4	1.4	150.1	146.0	4.1
3.00	11	87.8	83.7	81.3	80.4	4.1	159.1	149.3	9.8
3.30	0	93.2	91.6	86.0	86.0	1.6	162.0	153.8	8.3
4.30	0	82.9	82.0	80.6	80.2	0.9	150.3	147.8	2.6
5.00	0	80.2	79.7	78.6	79.0	0.5	147.4	145.6	1.8
5.15	0	78.4	78.4	77.5	77.5	0.0	145.4	144.4	1.0
6.00	0	76.6	76.3	76.1	76.1	0.4	143.5	142.9	0.6

APPENDIX D

IBM system 360/75 computer program and printout of percentage moisture contents of hay windrows under five treatments, at regular intervals during the experimental trials

FORTRAN IV G LEVEL 1, MOD 4 MAIN DATE = 69223 14/55/22

```
C      DRYING HAY IN WINDROWS
C      DETERMINATION OF MOISTURE CONTENTS
C      D.S.DUGGAL
       DIMENSION DISH(123),MAP(40),IDEN(5)
       MP=123
       READ4,(DISH(I),I=1,MP)
     4 FORMAT(10F6.2)
       PRINT 482
   482 FORMAT(1H1)
       PRINT88,(DISH(I),I=1,MP)
    88 FORMAT(1X,10F10.2)
       N=2
       NCR=4
       B=N
       BG=NCR*N
  2000 READ1,(MAP(I),I=1,35)
     1 FORMAT(35A2)
       READ 200,NMP
   200 FORMAT(I2)
       PRINT 992
   992 FORMAT(1H1)
       PRINT 789
 789   FORMAT(1H )
       PRINT 92
    92 FORMAT(   1X,73X,    34HPERCENTAGE MOISTURE CONTENT OF HAY)
       PRINT 98,(MAP(I),I=1,35)
    98 FORMAT(1X,73X,    27A2)
       PRINT 42
    42 FORMAT(  /1X,73X,1X,6HSAMPLE,1X,4HDISH,4X,4HDISH,1X,6HINITI-,2X,
      15HFINAL,3X,5HMOIS-,2X,6HSAMPLE)
       PRINT 32
    32 FORMAT(1X,73X,4X,3HNO.,2X,3HNO.,5X,3HWT.,1X,6HAL WT.,4X,3HWT.,4X,
      14HTURE,4X,4HMEAN)
       PRINT33
    33 FORMAT(1X,73X,16X,4HGMS.,3X,4HGMS.,3X,4HGMS.,4X,4HPCT.,4X,4HPCT./)
       NSL=1
       PRINT34,NSL
    34 FORMAT(1X,73X,9HTREATMENT,I2,1H.)
    78 SOM=0.
       DO 2 JM=1,NCR
       SUM=0.
       DO 2 J=1,N
       READ3,JQ,(IDEN(I),I=1,5),NO,WT1,FINAL
     3 FORMAT(I1,4X,5A2,1X,I4,2F10.1)
       IF(JQ)5,5,2000
     5 PER=(WT1-FINAL)/(WT1-DISH(NO))*100.
       PERR=PER
       SUM=SUM+PER
       SOM=SOM+PER
       IF(J-N)6,7,6
     7 AV=SUM/B
       PRINT 9,(IDEN(I),I=1,5),NO,DISH(NO),WT1,FINAL,PERR,AV
     9 FORMAT(1X,70X,5A2,1X,I4,F8.2,2F7.1,2F8.1)
       GO TO 2
     6 PRINT10,(IDEN(I),I=1,5),NO,DISH(NO),WT1,FINAL,PERR
    10 FORMAT(1X,70X,5A2,1X,I4,F8.2,2F7.1,F8.1)
     2 CONTINUE
       AVS=SOM/BG
       PRINT169,AVS
   169 FORMAT(1X,73X,30X,10HBLOCK MEAN,F6.1)
       NSL=NSL+NMP
       IF(NSL-5)100,100,78
   100 PRINT 34,NSL
       GO TO 78
 442   CALL EXIT
       END
```

TOTAL MEMORY REQUIREMENTS 000A82 BYTES

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 15 1968 11 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
I 1	101	81.80	161.1	106.9	68.3	
I 2	102	81.50	143.5	99.8	70.5	69.4
I 3	103	81.70	143.4	101.0	68.7	
I 4	104	81.00	140.3	100.5	67.1	67.9
I 5	105	81.90	164.8	106.2	70.7	
I 6	106	82.40	166.0	108.6	68.7	69.7

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 15 1968 12 NOON

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-2 1	107	81.90	127.0	99.7	60.5	
A 1-2 2	108	81.30	109.7	93.9	55.6	58.1
B 1-2 1	101	81.80	120.8	97.0	61.0	
B 1-2 2	102	81.50	120.7	96.0	63.0	62.0
C 1-2 1	101	81.80	142.0	107.8	56.8	
C 1-2 2	102	81.50	140.4	106.0	58.4	57.6
D 1-2 1	16	16.55	50.9	29.7	61.7	
D 1-2 2	20	17.15	51.3	30.0	62.4	62.0
				BLOCK MEAN 59.9		
TREATMENT 2.						
A 2-2 1	109	81.90	139.0	103.6	62.0	
A 2-2 2	110	81.60	131.6	101.8	59.6	60.8
B 2-2 1	103	81.70	112.3	93.8	60.5	
B 2-2 2	104	81.00	124.1	95.5	66.4	63.4
C 2-2 1	103	81.70	135.6	101.9	62.5	
C 2-2 2	104	81.00	150.4	108.7	60.1	61.3
D 2-2 1	111	81.00	119.0	96.0	60.5	
D 2-2 2	112	81.50	122.7	100.2	54.6	57.6
				BLOCK MEAN 60.8		
TREATMENT 3.						
A 3-2 1	10	17.10	37.6	24.8	62.4	
A 3-2 2	19	16.45	59.9	30.9	66.7	64.6
B 3-2 1	105	81.90	140.5	101.5	66.6	
B 3-2 2	106	82.40	125.4	95.9	68.6	67.6
C 3-2 1	105	81.90	111.6	92.2	65.3	
C 3-2 2	106	82.40	138.8	103.2	63.1	64.2
D 3-2 1	10	17.10	37.6	24.8	62.4	
D 3-2 2	19	16.45	59.9	30.9	66.7	64.6
				BLOCK MEAN 65.2		
TREATMENT 4.						
A 4-2 1	9	17.05	64.2	32.4	67.4	
A 4-2 2	12	17.05	69.5	34.8	66.2	66.8
B 4-2 1	107	81.90	145.5	101.6	69.0	
B 4-2 2	108	81.30	150.1	102.8	68.8	68.9
C 4-2 1	107	81.90	144.0	102.5	66.8	
C 4-2 2	108	81.30	140.7	99.1	70.0	68.4
D 4-2 1	4	16.75	32.6	21.6	69.4	
D 4-2 2	3	16.60	42.7	24.9	68.2	68.8
				BLOCK MEAN 68.2		
TREATMENT 5.						
A 5-2 1	2	16.70	63.9	32.8	65.9	
A 5-2 2	8	17.00	53.0	29.5	65.3	65.6
B 5-2 1	109	81.90	154.7	103.1	70.9	
B 5-2 2	110	81.60	139.5	99.8	68.6	69.7
C 5-2 1	109	81.90	115.3	95.0	60.8	
C 5-2 2	110	81.60	152.0	106.1	65.2	63.0
D 5-2 1	7	16.55	41.0	24.2	68.7	
D 5-2 2	6	16.60	46.1	25.9	68.5	68.6
				BLOCK MEAN 66.7		

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 15 1968 6 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-3 1	93	17.85	52.5	37.0	44.7	
A 1-3 2	94	17.70	45.1	34.7	38.0	41.3
B 1-3 1	76	17.40	34.2	26.9	43.5	
B 1-3 2	77	17.10	40.2	30.0	44.2	43.8
C 1-3 1	86	17.30	48.0	35.0	42.3	
C 1-3 2	87	17.90	44.3	32.8	43.6	43.0
D 1-3 1	46	17.90	45.4	34.0	41.5	
D 1-3 2	44	17.90	64.7	47.1	37.6	39.5
				BLOCK MEAN 41.9		
TREATMENT 2.						
A 2-3 1	95	18.00	72.0	49.5	41.7	
A 2-3 2	96	17.80	52.8	38.5	40.9	41.3
B 2-3 1	78	17.40	39.8	31.2	38.4	
B 2-3 2	79	17.40	43.8	33.5	39.0	38.7
C 2-3 1	88	17.50	48.8	34.9	44.4	
C 2-3 2	89	17.80	49.7	35.6	44.2	44.3
D 2-3 1	49	17.75	46.4	34.8	40.5	
D 2-3 2	40	16.90	47.8	34.5	43.0	41.8
				BLOCK MEAN 41.5		
TREATMENT 3.						
A 3-3 1	97	17.40	66.9	40.7	52.9	
A 3-3 2	98	17.30	55.5	37.0	48.4	50.7
B 3-3 1	80	17.10	51.2	33.0	53.4	
B 3-3 2	81	17.40	40.4	28.8	50.4	51.9
C 3-3 1	90	17.70	40.4	28.8	51.1	
C 3-3 2	91	17.80	45.4	30.2	55.1	53.1
D 3-3 1	27	17.10	47.9	32.2	51.0	
D 3-3 2	24	17.05	35.0	27.4	42.3	46.7
				BLOCK MEAN 50.6		
TREATMENT 4.						
A 4-3 1	99	17.85	80.3	36.2	70.6	
A 4-3 2	100	17.45	51.8	29.5	64.9	67.8
B 4-3 1	82	17.35	57.2	28.8	71.3	
B 4-3 2	83	17.10	45.8	25.6	70.4	70.8
C 4-3 1	92	17.45	63.7	34.1	64.0	
C 4-3 2	41	17.85	60.0	32.3	65.7	64.9
D 4-3 1	53	17.85	68.8	37.5	61.4	
D 4-3 2	21	16.85	45.4	26.5	66.2	63.8
				BLOCK MEAN 66.8		
TREATMENT 5.						
A 5-3 1	74	17.50	45.6	34.2	40.6	
A 5-3 2	75	17.60	50.2	36.1	43.3	41.9
B 5-3 1	84	17.10	50.4	35.3	45.3	
B 5-3 2	85	17.20	40.2	29.0	48.7	47.0
C 5-3 1	39	17.80	54.3	36.9	47.7	
C 5-3 2	51	17.60	54.3	37.1	46.9	47.3
D 5-3 1	50	17.50	57.0	38.3	47.3	
D 5-3 2	52	17.50	48.0	34.0	45.9	46.6
				BLOCK MEAN 45.7		

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 16 1968 8 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-4 1	1	16.60	41.8	32.6	36.5	
A 1-4 2	2	16.70	54.0	41.9	32.4	34.5
B 1-4 1	11	16.95	38.8	32.0	31.1	
B 1-4 2	12	17.05	47.3	36.5	35.7	33.4
C 1-4 1	21	16.85	42.8	35.1	29.7	
C 1-4 2	22	16.80	39.5	32.0	33.0	31.4
D 1-4 1	31	16.50	62.5	47.5	32.6	
D 1-4 2	32	16.15	57.8	43.9	33.4	33.0
				BLOCK MEAN	33.1	
TREATMENT 2.						
A 2-4 1	3	16.60	46.4	35.6	36.2	
A 2-4 2	4	16.75	49.0	37.0	37.2	36.7
B 2-4 1	13	16.95	54.5	42.2	32.8	
B 2-4 2	14	16.95	51.0	38.7	36.1	34.4
C 2-4 1	23	16.75	48.1	35.7	39.6	
C 2-4 2	24	17.05	51.6	39.6	34.7	37.1
D 2-4 1	33	16.15	44.8	35.3	33.2	
D 2-4 2	34	16.00	47.9	37.4	32.9	33.0
				BLOCK MEAN	35.3	
TREATMENT 3.						
A 3-4 1	5	16.75	52.4	40.0	34.8	
A 3-4 2	6	16.60	40.0	31.4	36.8	35.8
B 3-4 1	15	17.05	43.0	33.1	38.2	
B 3-4 2	16	16.55	39.7	30.8	38.4	38.3
C 3-4 1	25	17.15	46.2	35.2	37.9	
C 3-4 2	26	16.70	48.0	35.6	39.6	38.7
D 3-4 1	35	16.10	36.7	29.7	34.0	
D 3-4 2	36	16.20	47.6	35.4	38.9	36.4
				BLOCK MEAN	37.3	
TREATMENT 4.						
A 4-4 1	7	16.55	101.0	59.8	48.8	
A 4-4 2	8	17.00	52.3	37.6	41.6	45.2
B 4-4 1	17	16.45	48.7	32.1	51.5	
B 4-4 2	18	16.40	47.2	31.2	51.9	51.7
C 4-4 1	27	17.10	51.7	33.7	52.0	
C 4-4 2	28	16.90	68.4	38.9	57.3	54.7
D 4-4 1	37	16.95	68.3	40.1	54.9	
D 4-4 2	38	17.20	47.6	32.3	50.3	52.6
				BLOCK MEAN	51.1	
TREATMENT 5.						
A 5-4 1	9	17.05	37.5	30.4	34.7	
A 5-4 2	10	17.10	40.0	32.0	34.9	34.8
B 5-4 1	19	16.45	54.3	40.1	37.5	
B 5-4 2	20	17.15	57.1	41.2	39.8	38.7
C 5-4 1	29	16.25	47.2	36.3	35.2	
C 5-4 2	30	16.30	46.0	35.8	34.3	34.8
D 5-4 1	39	17.80	32.5	28.0	30.6	
D 5-4 2	40	16.90	45.7	34.7	38.2	34.4
				BLOCK MEAN	35.7	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 16 1968 12 NOON

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-5 1	1	16.60	33.0	29.0	24.4	
A 1-5 2	2	16.70	30.7	27.3	24.3	24.3
B 1-5 1	11	16.95	44.0	36.6	27.4	
B 1-5 2	12	17.05	41.5	35.1	26.2	26.8
C 1-5 1	21	16.85	60.0	49.0	25.5	
C 1-5 2	22	16.80	55.0	45.5	24.9	25.2
D 1-5 1	31	16.50	57.8	47.1	25.9	
D 1-5 2	32	16.15	40.3	34.8	22.8	24.3
				BLOCK MEAN	25.2	
TREATMENT 2.						
A 2-5 1	3	16.60	56.5	46.1	26.1	
A 2-5 2	4	16.75	44.8	37.5	26.0	26.0
B 2-5 1	13	16.95	52.0	43.2	25.1	
B 2-5 2	14	16.95	46.2	38.8	25.3	25.2
C 2-5 1	23	16.75	41.8	36.0	23.2	
C 2-5 2	24	17.05	54.3	44.2	27.1	25.1
D 2-5 1	33	16.15	50.0	42.2	23.0	
D 2-5 2	34	16.00	52.3	43.4	24.5	23.8
				BLOCK MEAN	25.0	
TREATMENT 3.						
A 3-5 1	5	16.75	37.5	30.5	33.7	
A 3-5 2	6	16.60	39.6	32.0	33.0	33.4
B 3-5 1	15	17.05	46.2	35.2	37.7	
B 3-5 2	16	16.55	40.1	32.5	32.3	35.0
C 3-5 1	25	17.15	47.5	35.6	39.2	
C 3-5 2	26	16.70	47.3	36.9	34.0	36.6
D 3-5 1	35	16.10	51.6	39.0	35.5	
D 3-5 2	36	16.20	51.0	38.5	35.9	35.7
				BLOCK MEAN	35.2	
TREATMENT 4.						
A 4-5 1	7	16.55	45.6	33.8	40.6	
A 4-5 2	8	17.00	57.0	39.8	43.0	41.8
B 4-5 1	17	16.45	55.0	38.7	42.3	
B 4-5 2	18	16.40	51.8	36.8	42.4	42.3
C 4-5 1	27	17.10	52.0	36.7	43.8	
C 4-5 2	28	16.90	50.8	35.6	44.8	44.3
D 4-5 1	37	16.95	43.2	33.0	38.9	
D 4-5 2	38	17.20	34.9	27.0	44.6	41.7
				BLOCK MEAN	42.6	
TREATMENT 5.						
A 5-5 1	9	17.05	33.8	28.7	30.4	
A 5-5 2	10	17.10	31.3	27.3	28.2	29.3
B 5-5 1	19	16.45	43.6	36.3	26.9	
B 5-5 2	20	17.15	52.5	42.6	28.0	27.4
C 5-5 1	29	16.25	46.9	37.4	31.0	
C 5-5 2	30	16.30	48.1	39.9	25.8	28.4
D 5-5 1	39	17.80	51.2	41.8	28.1	
D 5-5 2	40	16.90	45.7	37.8	27.4	27.8
				BLOCK MEAN	28.2	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 17 1968 9 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-7 1	51	17.60	76.2	33.5	72.9	
A 1-7 2	52	17.50	101.6	40.3	72.9	72.9
B 1-7 1	61	17.70	99.7	44.3	67.6	
B 1-7 2	62	17.65	95.6	41.2	69.8	68.7
C 1-7 1	71	17.45	74.9	32.8	73.3	
C 1-7 2	72	17.80	106.3	41.0	73.8	73.5
D 1-7 1	81	17.40	92.6	41.1	68.5	
D 1-7 2	82	17.35	126.1	52.6	67.6	68.0
				BLOCK MEAN	70.8	
TREATMENT 2.						
A 2-7 1	53	17.85	82.3	37.2	70.0	
A 2-7 2	54	17.35	84.8	37.1	70.7	70.3
B 2-7 1	63	17.90	58.3	30.3	69.3	
B 2-7 2	64	17.70	88.4	41.0	67.0	68.2
C 2-7 1	73	17.25	110.0	48.1	66.7	
C 2-7 2	74	17.50	103.6	45.8	67.1	66.9
D 2-7 1	83	17.10	79.6	34.0	73.0	
D 2-7 2	84	17.10	97.1	43.4	67.1	70.0
				BLOCK MEAN	68.9	
TREATMENT 3.						
A 3-7 1	55	17.65	85.0	35.6	73.3	
A 3-7 2	56	17.80	88.6	37.7	71.9	72.6
B 3-7 1	65	17.45	70.2	32.8	70.9	
B 3-7 2	66	17.30	82.0	34.1	74.0	72.5
C 3-7 1	75	17.60	125.1	44.4	75.1	
C 3-7 2	76	17.40	96.5	37.7	74.3	74.7
D 3-7 1	85	17.20	99.7	42.8	69.0	
D 3-7 2	86	17.30	98.4	41.3	70.4	69.7
				BLOCK MEAN	72.4	
TREATMENT 4.						
A 4-7 1	57	17.60	68.0	37.0	61.5	
A 4-7 2	58	17.80	80.0	42.1	60.9	61.2
B 4-7 1	67	17.10	54.7	30.8	63.6	
B 4-7 2	68	17.45	47.5	26.7	69.2	66.4
C 4-7 1	77	17.10	76.4	37.1	66.3	
C 4-7 2	78	17.40	85.0	37.9	69.7	68.0
D 4-7 1	87	17.90	51.6	29.7	65.0	
D 4-7 2	88	17.50	45.7	26.0	69.9	67.4
				BLOCK MEAN	65.8	
TREATMENT 5.						
A 5-7 1	59	17.70	94.0	50.4	57.1	
A 5-7 2	60	17.80	80.1	43.8	58.3	57.7
B 5-7 1	69	17.65	89.7	45.2	61.8	
B 5-7 1	70	17.50	76.0	39.6	62.2	62.0
C 5-7 1	79	17.40	77.8	36.8	67.9	
C 5-7 2	80	17.10	82.7	36.7	70.1	69.0
D 5-7 1	89	17.80	48.6	31.2	56.5	
D 5-7 2	90	17.70	58.8	33.8	60.8	58.7
				BLOCK MEAN	61.8	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 17 1968 12 NOON

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITI- AL WT. GMS.	FINAL WT. GMS.	MOIS- TURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-8 1	1	16.60	59.2	35.5	55.6	
A 1-8 2	2	16.70	50.3	30.2	59.8	57.7
B 1-8 1	11	16.95	76.5	40.9	59.8	
B 1-8 2	12	17.05	69.1	36.0	63.6	61.7
C 1-8 1	21	16.85	92.0	47.2	59.6	
C 1-8 2	22	16.80	71.0	41.4	54.6	57.1
D 1-8 1	31	16.50	64.5	35.7	60.0	
D 1-8 2	32	16.15	46.4	27.8	61.5	60.7
				BLOCK MEAN	59.3	
TREATMENT 2.						
A 2-8 1	3	16.60	58.3	36.1	53.2	
A 2-8 2	4	16.75	67.9	36.6	61.2	57.2
B 2-8 1	13	16.95	50.8	33.1	52.3	
B 2-8 2	14	16.95	75.8	41.2	58.8	55.5
C 2-8 1	23	16.75	58.0	35.5	54.5	
C 1-8 1	24	17.05	65.6	41.2	50.3	52.4
D 2-8 1	33	16.15	63.1	35.5	58.8	
D 2-8 2	34	16.00	58.0	35.2	54.3	56.5
				BLOCK MEAN	55.4	
TREATMENT 3.						
A 3-8 1	5	16.75	55.4	34.5	54.1	
A 3-8 2	6	16.60	50.0	30.2	59.3	56.7
B 3-8 1	15	17.05	63.6	35.7	59.9	
B 3-8 2	16	16.55	66.2	35.8	61.2	60.6
C 3-8 1	25	17.15	50.0	30.0	60.9	
C 3-8 2	26	16.70	51.0	30.5	59.8	60.3
D 3-8 1	35	16.10	76.3	38.4	63.0	
D 3-8 2	36	16.20	50.6	31.0	57.0	60.0
				BLOCK MEAN	59.4	
TREATMENT 4.						
A 4-8 1	7	16.55	57.6	36.3	51.9	
A 4-8 2	8	17.00	53.1	36.9	44.9	48.4
B 4-8 1	17	16.45	46.5	32.9	45.3	
B 4-8 2	18	16.40	57.8	36.6	51.2	48.2
C 4-8 1	27	17.10	57.8	37.0	51.1	
C 4-8 2	28	16.90	58.8	37.4	51.1	51.1
D 4-8 1	37	16.95	55.0	35.3	51.8	
D 4-8 2	38	17.20	35.9	26.0	52.9	52.4
				BLOCK MEAN	50.0	
TREATMENT 5.						
A 5-8 1	9	17.05	46.9	31.5	51.6	
A 5-8 2	10	17.10	47.6	34.0	44.6	48.1
B 5-8 1	19	16.45	69.6	43.0	50.0	
B 5-8 2	20	17.15	66.5	40.4	52.9	51.5
C 5-8 1	29	16.25	46.0	31.8	47.7	
C 5-8 2	30	16.30	49.7	34.0	47.0	47.4
D 5-8 1	39	17.80	45.5	32.8	45.8	
D 5-8 2	40	16.90	47.2	34.4	42.2	44.0
				BLOCK MEAN	47.7	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 17 1968 6 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-9 1	1	16.60	43.8	34.6	33.8	
A 1-9 2	2	16.70	48.4	36.3	38.2	36.0
B 1-9 1	11	16.95	55.5	42.1	34.8	
B 1-9 2	12	17.05	38.2	30.6	35.9	35.3
C 1-9 1	21	16.85	40.0	33.1	29.8	
C 1-9 2	22	16.80	43.0	34.0	34.4	32.1
D 1-9 1	31	16.50	47.0	37.6	30.8	
D 1-9 2	32	16.15	48.1	36.0	37.9	34.3
				BLOCK MEAN 34.4		
TREATMENT 2.						
A 2-9 1	3	16.60	49.0	40.0	27.8	
A 2-9 2	4	16.75	41.0	33.5	30.9	29.4
B 2-9 1	13	16.95	33.5	28.4	30.8	
B 2-9 2	14	16.95	31.5	27.9	24.7	27.8
C 2-9 1	23	16.75	51.2	41.1	29.3	
C 2-9 2	24	17.05	43.0	35.5	28.9	29.1
D 2-9 1	33	16.15	38.6	32.3	28.1	
D 2-9 2	34	16.00	65.5	48.8	33.7	30.9
				BLOCK MEAN 29.3		
TREATMENT 3.						
A 3-9 1	5	16.75	43.0	34.1	33.9	
A 3-9 1	6	16.60	52.5	38.4	39.3	36.6
B 3-9 1	15	17.05	35.5	28.6	37.4	
B 3-9 2	16	16.55	35.9	28.5	38.2	37.8
C 3-9 1	25	17.15	41.5	33.0	34.9	
C 3-9 2	26	16.70	38.0	29.4	40.4	37.6
D 3-9 1	35	16.10	39.0	30.5	37.1	
D 3-9 2	36	16.20	53.0	38.6	39.1	38.1
				BLOCK MEAN 37.5		
TREATMENT 4.						
A 4-9 1	7	16.55	65.0	36.4	59.0	
A 4-9 2	8	17.00	63.3	36.2	58.5	58.8
B 4-9 1	17	16.45	44.5	28.1	58.5	
B 4-9 2	18	16.40	50.6	29.2	62.6	60.5
C 4-9 1	27	17.10	49.5	31.1	56.8	
C 4-9 2	28	16.90	56.5	30.6	65.4	61.1
D 4-9 1	37	16.95	56.8	31.8	62.7	
D 4-9 2	38	17.20	60.1	34.8	59.0	60.9
				BLOCK MEAN 60.3		
TREATMENT 5.						
A 5-9 1	9	17.05	43.4	29.1	54.3	
A 5-9 2	10	17.10	44.6	30.9	49.8	52.0
B 5-9 1	19	16.45	54.6	35.0	51.4	
B 5-9 2	20	17.15	59.0	39.0	47.8	49.6
C 5-9 1	29	16.25	44.6	30.2	50.8	
C 5-9 2	30	16.30	64.1	37.1	56.5	53.6
D 5-9 1	39	17.80	85.5	48.8	54.2	
D 5-9 2	40	16.90	40.2	29.5	45.9	50.1
				BLOCK MEAN 51.3		

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 18 1968 8 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A1-10 1	1	16.60	46.8	35.1	38.7	
A1-10 2	2	16.70	39.2	30.7	37.8	38.3
B1-10 1	11	16.95	41.7	33.9	31.5	
B1-10 2	12	17.05	43.7	34.6	34.1	32.8
C1-10 1	21	16.85	54.5	42.1	32.9	
C1-10 2	22	16.80	51.1	38.8	35.9	34.4
D1-10 1	31	16.50	58.3	42.5	37.8	
D1-10 2	32	16.15	48.0	35.8	38.3	38.1
				BLOCK MEAN	35.9	
TREATMENT 2.						
A2-10 1	3	16.60	40.5	32.6	33.1	
A2-10 2	4	16.75	46.3	35.8	35.5	34.3
B2-10 1	13	16.95	44.0	35.2	32.5	
B2-10 2	14	16.95	42.3	34.0	32.7	32.6
C2-10 1	23	16.75	44.7	35.3	33.6	
C2-10 2	24	17.05	41.5	32.8	35.6	34.6
D2-10 1	33	16.15	62.5	47.0	33.4	
D2-10 2	34	16.00	35.6	28.6	35.7	34.6
				BLOCK MEAN	34.0	
TREATMENT 3.						
A3-10 1	5	16.75	45.3	34.3	38.5	
A3-10 2	6	16.60	38.2	29.6	39.8	39.2
B3-10 1	15	17.05	43.1	34.5	33.0	
B3-10 2	16	16.55	52.8	38.4	39.7	36.4
C3-10 1	25	17.15	41.9	32.5	38.0	
C3-10 2	26	16.70	40.3	31.0	39.4	38.7
D3-10 1	35	16.10	38.1	30.5	34.5	
D3-10 2	36	16.20	35.4	28.8	34.4	34.5
				BLOCK MEAN	37.2	
TREATMENT 4.						
A4-10 1	7	16.55	43.2	32.5	40.2	
A4-10 2	8	17.00	62.4	41.6	45.8	43.0
B4-10 1	17	16.45	44.4	31.0	47.9	
B4-10 2	18	16.40	42.0	30.8	43.8	45.8
C4-10 1	27	17.10	57.3	38.6	46.5	
C4-10 2	28	16.90	42.6	30.8	45.9	46.2
D4-10 1	37	16.95	69.7	46.0	44.9	
D4-10 2	38	17.20	35.4	27.0	46.2	45.5
				BLOCK MEAN	45.1	
TREATMENT 5.						
A5-10 1	9	17.05	38.7	31.0	35.6	
A5-10 2	10	17.10	48.3	36.5	37.8	36.7
B5-10 1	19	16.45	51.8	38.6	37.3	
B5-10 2	20	17.15	47.9	35.5	40.3	38.8
C5-10 1	29	16.25	35.0	28.1	36.8	
C5-10 2	30	16.30	35.7	28.3	38.1	37.5
D5-10 1	39	17.80	43.1	34.7	33.2	
D5-10 2	40	16.90	47.5	35.0	40.8	37.0
				BLOCK MEAN	37.5	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MACDONALD COLLEGE FARM JULY 18 1968 12 NOON

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A1-11 1	11	16.95	25.6	23.5	24.3	
A1-11 2	12	17.05	25.6	23.8	21.1	22.7
B1-11 1	21	16.85	26.3	24.4	20.1	
B1-11 2	22	16.80	28.3	25.5	24.3	22.2
C1-11 1	31	16.50	23.5	21.8	24.3	
C1-11 2	32	16.15	25.6	23.5	22.2	23.3
D1-11 1	41	17.85	29.8	27.0	23.4	
D1-11 2	42	18.05	28.3	25.8	24.4	23.9
				BLOCK MEAN	23.0	
TREATMENT 2.						
A2-11 1	13	16.95	29.2	26.6	21.2	
A2-11 2	14	16.95	25.8	23.8	22.6	21.9
B2-11 1	23	16.75	25.2	23.3	22.5	
B2-11 2	24	17.05	27.5	25.0	23.9	23.2
C2-11 1	33	16.15	20.6	19.7	20.2	
C2-11 2	34	16.00	34.6	30.2	23.7	21.9
D2-11 1	43	18.05	29.0	26.2	25.6	
D2-11 2	44	17.90	27.0	25.1	20.9	23.2
				BLOCK MEAN	22.6	
TREATMENT 3.						
A3-11 1	15	17.05	24.1	22.4	24.1	
A3-11 2	16	16.55	25.6	23.2	26.5	25.3
B3-11 1	25	17.15	25.6	23.3	27.2	
B3-11 2	26	16.70	29.8	26.5	25.2	26.2
C3-11 1	35	16.10	29.5	25.8	27.6	
C3-11 2	36	16.20	26.2	23.4	28.0	27.8
D3-11 1	45	17.85	32.0	28.0	28.3	
D3-11 2	46	17.90	48.0	39.0	29.9	29.1
				BLOCK MEAN	27.1	
TREATMENT 4.						
A4-11 1	17	16.45	46.0	33.2	43.3	
A4-11 2	18	16.40	57.5	40.3	41.8	42.6
B4-11 1	27	17.10	47.0	34.1	43.1	
B4-11 2	28	16.90	51.2	36.8	42.0	42.6
C4-11 1	37	16.95	53.0	37.7	42.4	
C4-11 2	38	17.20	51.0	37.0	41.4	41.9
D4-11 1	47	17.90	43.2	32.3	43.1	
D4-11 2	48	17.70	53.0	38.8	40.2	41.7
				BLOCK MEAN	42.2	
TREATMENT 5.						
A5-11 1	19	16.45	31.2	26.3	33.2	
A5-11 2	20	17.15	34.7	29.2	31.3	32.3
B5-11 1	29	16.25	36.0	30.6	27.3	
B5-11 2	30	16.30	28.0	24.5	29.9	28.6
C5-11 1	39	17.80	28.3	24.8	33.3	
C5-11 2	40	16.90	27.0	24.0	29.7	31.5
D5-11 1	49	17.75	36.0	30.6	29.6	
D5-11 2	50	17.50	28.7	25.5	28.6	29.1
				BLOCK MEAN	30.4	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 29 1968 8 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITI-AL WT. GMS.	FINAL WT. GMS.	MOIS-TURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
I 1	1	16.60	77.7	36.5	67.4	
I 2	2	16.70	63.0	30.1	71.1	69.2
I 3	3	16.60	76.0	34.2	70.4	
I 4	4	16.75	66.2	31.0	71.2	70.8
I 5	5	16.75	121.3	48.2	69.9	
I 6	6	16.60	81.9	35.4	71.2	70.6

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 29 1968 10 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-1A1	51	17.60	54.8	30.0	66.7	
A 1-1A2	52	17.50	49.2	27.7	67.8	67.2
B 1-1A1	55	17.65	75.5	34.7	70.5	
B 1-1A2	56	17.80	84.4	40.5	65.9	68.2
C 1-1A1	59	17.70	67.0	34.7	65.5	
A 5-1A2	54	17.35	77.8	39.1	64.0	64.8
C 1-1A2	60	17.80	59.5	31.6	66.9	
D 1-1A1	63	17.90	67.4	37.0	61.4	64.2
				BLOCK MEAN	66.1	
TREATMENT 5.						
D 1-1A2	64	17.70	60.0	30.3	70.2	
A 5-1A1	53	17.85	76.4	37.9	65.8	68.0
B 5-1A1	57	17.60	62.8	33.4	65.0	
B 5-1A2	58	17.80	80.0	34.9	72.5	68.8
C 5-1A1	61	17.70	67.6	32.0	71.3	
C 5-1A2	62	17.65	79.3	35.6	70.9	71.1
D 5-1A1	65	17.45	63.3	32.8	66.5	
D 5-1A2	66	17.30	66.3	33.2	67.6	67.0
				BLOCK MEAN	68.7	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 29 1968 12 NOON

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-2 1	41	17.85	75.8	39.5	62.6	
A 1-2 2	42	18.05	53.9	32.7	59.1	60.9
B 1-2 1	1	16.60	66.0	36.0	60.7	
B 1-2 2	2	16.70	58.5	35.4	55.3	58.0
C 1-2 1	21	16.85	63.8	35.9	59.4	
C 1-2 2	22	16.80	52.4	33.2	53.9	56.7
D 1-2 1	31	16.50	60.6	35.0	58.0	
D 1-2 2	32	16.15	66.4	35.8	60.9	59.5
				BLOCK MEAN 58.8		
TREATMENT 2.						
A 2-2 1	43	18.05	64.0	37.2	58.3	
A 2-2 2	44	17.90	61.6	35.2	60.4	59.4
B 2-2 1	3	16.60	71.2	36.4	63.7	
B 2-2 2	4	16.75	63.2	35.4	59.8	61.8
C 2-2 1	23	16.75	59.8	33.2	61.8	
C 2-2 2	24	17.05	63.8	35.5	60.5	61.2
D 2-2 1	33	16.15	86.9	41.8	63.7	
D 2-2 2	34	16.00	53.0	30.7	60.3	62.0
				BLOCK MEAN 61.1		
TREATMENT 3.						
A 3-2 1	45	17.85	91.9	41.3	68.3	
A 3-2 2	46	17.90	73.0	36.7	65.9	67.1
B 3-2 1	5	16.75	69.8	36.7	62.4	
B 3-2 2	13	16.95	76.0	38.0	64.4	63.4
C 3-2 1	25	17.15	55.0	31.8	61.3	
C 3-2 2	26	16.70	56.0	33.5	57.3	59.3
D 3-2 1	35	16.10	52.7	30.4	60.9	
D 3-2 2	36	16.20	115.0	48.9	66.9	63.9
				BLOCK MEAN 63.4		
TREATMENT 4.						
A 4-2 1	47	17.90	66.0	36.9	60.5	
A 4-2 2	48	17.70	82.7	38.9	67.4	63.9
B 4-2 1	12	17.05	68.4	34.4	66.2	
B 4-2 2	8	17.00	60.1	34.2	60.1	63.2
C 4-2 1	27	17.10	63.5	31.7	68.5	
C 4-2 2	28	16.90	66.2	34.3	64.7	66.6
D 4-2 1	37	16.95	76.1	38.1	64.2	
D 4-2 2	38	17.20	85.9	40.6	65.9	65.1
				BLOCK MEAN 64.7		
TREATMENT 5.						
A 5-2 1	49	17.75	97.0	41.7	69.8	
A 5-2 2	50	17.50	65.8	34.8	64.2	67.0
B 5-2 1	9	17.05	61.9	32.8	64.9	
B 5-2 2	10	17.10	75.0	36.4	66.7	65.8
C 5-2 1	29	16.25	73.0	32.9	70.7	
C 5-2 2	30	16.30	56.7	30.8	64.1	67.4
D 5-2 1	39	17.80	88.7	38.8	70.4	
D 5-2 2	40	16.90	99.7	42.4	69.2	69.8
				BLOCK MEAN 67.5		

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 29 1968 2 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-2A1	21	16.85	51.3	33.1	52.8	
A 1-2A2	22	16.80	54.0	37.7	43.8	48.3
B 1-2A1	25	17.15	66.4	39.2	55.2	
B 1-2A2	26	16.70	52.7	35.6	47.5	51.4
C 1-2A1	29	16.25	46.7	33.0	45.0	
C 1-2A2	30	16.30	48.6	33.7	46.1	45.6
D 1-2A1	33	16.15	52.3	32.5	54.8	
D 1-2A2	34	16.00	56.5	35.7	51.4	53.1
				BLOCK MEAN	49.6	
TREATMENT 5.						
A 5-2A1	23	16.75	68.4	40.0	55.0	
A 5-2A2	24	17.05	76.7	44.0	54.8	54.9
B 5-2A1	27	17.10	58.8	34.0	59.5	
B 5-2A2	28	16.90	67.5	36.3	61.7	60.6
C 5-2A1	31	16.50	47.6	31.2	52.7	
C 5-2A2	32	16.15	65.3	36.7	58.2	55.5
D 5-2A1	35	16.10	60.4	33.8	60.0	
D 5-2A2	36	16.20	71.7	38.0	60.7	60.4
				BLOCK MEAN	57.8	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 29 1968 4 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-2B1	67	17.10	54.2	37.7	44.5	
A 1-2B2	68	17.45	47.9	31.5	53.9	49.2
B 1-2B1	71	17.45	41.9	32.0	40.5	
B 1-2B2	72	17.80	57.5	37.4	50.6	45.6
C 1-2B1	75	17.60	47.9	33.8	46.5	
C 1-2B2	76	17.40	51.0	35.0	47.6	47.1
D 1-2B1	79	17.40	58.8	40.6	44.0	
D 1-2B2	80	17.10	51.9	35.7	46.6	45.3
				BLOCK MEAN	46.8	
TREATMENT 5.						
A 5-2B1	69	17.65	76.2	44.3	54.5	
A 5-2B2	70	17.50	68.0	39.8	55.8	55.2
B 5-2B1	73	17.25	73.3	41.6	56.6	
B 5-2B2	74	17.50	47.3	31.7	52.3	54.5
C 5-2B1	77	17.10	60.7	35.5	57.8	
C 5-2B2	78	17.40	56.0	35.8	52.3	55.1
D 5-2B1	81	17.40	52.1	33.5	53.6	
D 5-2B2	82	17.35	52.8	33.1	55.6	54.6
				BLOCK MEAN	54.8	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 29 1968 6 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITI- AL WT. GMS.	FINAL WT. GMS.	MOIS- TURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-3 1	1	16.60	48.2	36.8	36.1	
A 1-3 2	2	16.70	50.4	40.5	29.4	32.7
B 1-3 1	21	16.85	49.1	37.7	35.3	
B 1-3 2	22	16.80	48.6	36.6	37.7	36.5
C 1-3 1	11	16.95	65.5	49.0	34.0	
C 1-3 2	12	17.05	34.9	27.7	40.3	37.2
D 1-3 1	29	16.25	52.5	37.7	40.8	
D 1-3 2	30	16.30	55.1	41.5	35.1	37.9
				BLOCK MEAN	36.1	
TREATMENT 2.						
A 2-3 1	3	16.60	51.5	35.7	45.3	
A 2-3 2	4	16.75	45.5	33.1	43.1	44.2
B 2-3 1	23	16.75	74.0	47.5	46.3	
B 2-3 2	24	17.05	58.0	41.9	39.3	42.8
C 2-3 1	13	16.95	34.9	27.7	40.1	
C 2-3 2	14	16.95	91.5	58.0	44.9	42.5
D 2-3 1	33	16.15	47.2	36.0	36.1	
D 2-3 2	34	16.00	45.0	32.9	41.7	38.9
				BLOCK MEAN	42.1	
TREATMENT 3.						
A 3-3 1	5	16.75	42.0	29.8	48.3	
A 3-3 2	6	16.60	58.4	38.3	48.1	48.2
B 3-3 1	25	17.15	61.6	40.7	47.0	
B 3-3 2	26	16.70	50.7	34.3	48.2	47.6
C 3-3 1	15	17.05	57.5	38.2	47.7	
C 3-3 2	16	16.55	44.8	32.4	43.9	45.8
D 3-3 1	35	16.10	74.6	48.1	45.3	
D 3-3 2	36	16.20	46.0	31.6	48.3	46.8
				BLOCK MEAN	47.1	
TREATMENT 4.						
A 4-4 1	7	16.55	65.0	35.6	60.7	
A 4-4 2	8	17.00	65.3	33.1	66.7	63.7
B 4-3 1	27	17.10	86.0	43.0	62.4	
B 4-3 2	28	16.90	83.8	40.5	64.7	63.6
C 4-3 1	17	16.45	64.0	35.9	59.1	
C 4-3 2	18	16.40	71.8	35.8	65.0	62.0
D 4-3 1	37	16.95	84.7	43.7	60.5	
D 4-3 2	38	17.20	70.0	38.2	60.2	60.4
				BLOCK MEAN	62.4	
TREATMENT 5.						
A 5-5 1	9	17.05	52.7	34.4	51.3	
A 5-5 2	10	17.10	52.4	35.1	49.0	50.2
B 5-3 1	31	16.50	60.7	41.0	44.6	
B 5-3 2	32	16.15	68.5	44.0	46.8	45.7
C 5-3 1	19	16.45	61.6	42.0	43.4	
C 5-3 2	20	17.15	52.3	37.1	43.2	43.3
D 5-3 1	39	17.80	110.0	66.5	47.2	
D 5-3 2	40	16.90	53.8	35.4	49.9	48.5
				BLOCK MEAN	46.9	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 29 1968 8 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-3A1	83	17.10	37.0	30.5	32.7	
A 1-3A2	84	17.10	53.8	41.8	32.7	32.7
B 1-3A1	87	17.90	55.2	41.4	37.0	
B 1-3A2	88	17.50	48.4	37.4	35.6	36.3
C 1-3A1	91	17.80	46.6	35.4	38.9	
C 1-3A2	92	17.45	48.2	37.2	35.8	37.3
D 1-3A1	95	18.00	42.4	33.7	35.7	
D 1-3A2	96	17.80	53.7	40.4	37.0	36.4
				BLOCK MEAN	35.7	
TREATMENT 5.						
A 5-3A1	85	17.20	60.2	38.8	49.8	
A 5-3A2	94	17.70	57.7	38.5	48.0	48.9
B 5-3A1	89	17.80	58.5	38.9	48.2	
B 5-3A2	90	17.70	55.1	35.5	52.4	50.3
C 5-3A1	93	17.85	48.4	34.2	46.5	
C 5-3A2	86	17.30	48.4	33.7	47.3	46.9
D 5-3A1	97	17.40	49.4	35.0	45.0	
D 5-3A2	98	17.30	54.3	35.0	52.2	48.6
				BLOCK MEAN	48.7	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 29 1968 10 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-3B1	41	17.85	48.3	35.7	41.4	
A 1-3B2	42	18.05	43.4	33.3	39.8	40.6
B 1-3B1	45	17.85	49.7	36.9	40.2	
B 1-3B2	46	17.90	47.9	35.9	40.0	40.1
C 1-3B1	51	17.60	47.5	37.0	35.1	
C 1-3B2	52	17.50	45.8	36.0	34.6	34.9
D 1-3B1	55	17.65	47.8	35.0	42.5	
D 1-3B2	56	17.80	42.4	33.4	36.6	39.5
				BLOCK MEAN	38.8	
TREATMENT 5.						
A 5-3B1	43	18.05	54.3	38.5	43.6	
A 5-3B2	44	17.90	49.3	35.0	45.5	44.6
B 5-3B1	47	17.90	51.6	36.5	44.8	
B 5-3B2	48	17.70	49.0	34.5	46.3	45.6
C 5-3B1	53	17.85	56.0	39.4	43.5	
C 5-3B2	54	17.35	50.0	35.1	45.6	44.6
D 5-3B1	57	17.60	74.0	47.5	47.0	
D 5-3B2	58	17.80	45.5	31.8	49.5	48.2
				BLOCK MEAN	45.7	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 30 1968 8 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-4 1	87	17.90	48.8	37.4	36.9	
A 1-4 2	82	17.35	44.6	36.5	29.7	33.3
B 1-4 1	91	17.80	45.9	36.8	32.4	
B 1-4 2	92	17.45	42.0	34.0	32.6	32.5
C 1-4 1	51	17.60	43.2	33.6	37.5	
C 1-4 2	52	17.50	61.3	46.0	34.9	36.2
D 1-4 1	61	17.70	41.9	32.0	40.9	
D 1-4 2	62	17.65	46.5	34.7	40.9	40.9
				BLOCK MEAN	35.7	
TREATMENT 2.						
A 2-4 1	83	17.10	51.3	39.8	33.6	
A 2-4 2	84	17.10	45.8	36.3	33.1	33.4
B 2-4 1	93	17.85	62.9	46.4	36.6	
B 2-4 2	94	17.70	50.3	36.4	42.6	39.6
C 2-4 1	53	17.85	44.5	35.4	34.1	
C 2-4 2	54	17.35	49.7	38.0	36.2	35.2
D 2-4 1	63	17.90	45.3	37.0	30.3	
D 2-4 2	64	17.70	45.3	36.4	32.2	31.3
				BLOCK MEAN	34.9	
TREATMENT 3.						
A 3-4 1	85	17.20	49.0	32.0	53.5	
A 3-4 2	86	17.30	63.5	42.4	45.7	49.6
B 3-4 1	95	18.00	55.7	36.4	51.2	
B 3-4 2	96	17.80	45.5	30.4	54.5	52.9
C 3-4 1	55	17.65	56.0	35.0	54.8	
C 3-4 2	56	17.80	56.7	35.0	55.8	55.3
D 3-4 1	65	17.45	57.5	40.3	42.9	
D 3-4 2	66	17.30	48.0	33.4	47.6	45.3
				BLOCK MEAN	50.7	
TREATMENT 4.						
A 4-4 1	87	17.90	55.8	35.4	53.8	
A 4-4 2	88	17.50	63.5	35.0	62.0	57.9
B 4-4 1	97	17.40	52.0	32.8	55.5	
B 4-4 2	98	17.30	53.0	32.8	56.6	56.0
C 4-4 1	57	17.60	60.8	38.3	52.1	
C 4-4 2	58	17.80	55.7	34.7	55.4	53.7
D 4-4 1	67	17.10	56.4	31.4	63.6	
D 4-4 2	68	17.45	60.5	34.3	60.9	62.2
				BLOCK MEAN	57.5	
TREATMENT 5.						
A 5-4 1	89	17.80	40.6	31.8	38.6	
A 5-4 2	90	17.70	87.4	62.4	35.9	37.2
B 5-4 1	99	17.85	50.7	37.5	40.2	
B 5-4 2	100	17.45	54.0	39.8	38.9	39.5
C 5-4 1	59	17.70	47.3	34.7	42.6	
C 5-4 2	60	17.80	56.2	43.3	33.6	38.1
D 5-4 1	69	17.65	52.1	39.0	38.0	
D 5-4 2	70	17.50	58.5	41.2	42.2	40.1
				BLOCK MEAN	38.7	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 30 1968 10 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-4A1	51	17.60	42.0	34.8	29.5	
A 1-4A2	52	17.50	53.2	42.4	30.3	29.9
B 1-4A1	55	17.65	39.3	32.0	33.7	
B 1-4A2	56	17.80	49.8	40.6	28.7	31.2
C 1-4A1	59	17.70	39.5	33.9	25.7	
C 1-4A2	60	17.80	44.6	37.1	28.0	26.8
D 1-4A1	63	17.90	49.4	40.9	27.0	
D 1-4A2	64	17.70	45.8	39.3	23.1	25.1
				BLOCK MEAN	28.3	
TREATMENT 5.						
A 5-4A1	53	17.85	43.0	34.4	34.2	
A 5-4A2	54	17.35	42.6	33.4	36.4	35.3
B 5-4A1	57	17.60	42.1	33.2	36.3	
B 5-4A2	58	17.80	42.2	34.9	29.9	33.1
C 5-4A1	61	17.70	43.0	35.3	30.4	
C 5-4A2	62	17.65	55.1	41.6	36.0	33.2
D 5-4A1	65	17.45	42.8	35.2	30.0	
D 5-4A2	66	17.30	87.4	62.4	35.7	32.8
				BLOCK MEAN	33.6	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 30 1968 12 NOON

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-5 1	41	17.85	46.3	41.0	18.6	
A 1-5 2	42	18.05	39.2	33.9	25.1	21.8
B 1-5 1	51	17.60	43.0	35.9	28.0	
B 1-5 2	52	17.50	39.7	34.9	21.6	24.8
C 1-5 1	61	17.70	45.8	40.0	20.6	
C 1-5 2	62	17.65	41.0	35.8	22.3	21.5
D 1-5 1	71	17.45	42.3	36.3	24.1	
D 1-5 2	72	17.80	42.8	37.0	23.2	23.7
				BLOCK MEAN	22.9	
TREATMENT 2.						
A 2-5 1	43	18.05	49.8	41.6	25.8	
A 2-5 2	44	17.90	44.8	36.7	30.1	28.0
B 2-5 1	53	17.85	49.3	39.9	29.9	
B 2-5 2	54	17.35	47.2	38.1	30.5	30.2
C 2-5 1	63	17.90	38.4	31.8	32.2	
C 2-5 2	64	17.70	57.0	45.9	28.2	30.2
D 2-5 1	73	17.25	40.0	32.1	34.7	
D 2-5 2	74	17.50	49.1	40.0	28.8	31.8
				BLOCK MEAN	30.0	
TREATMENT 3.						
A 3-5 1	45	17.85	65.8	43.0	47.5	
A 3-5 2	46	17.90	48.7	36.2	40.6	44.1
B 3-5 1	55	17.65	48.9	38.3	33.9	
B 3-5 2	56	17.80	58.2	39.9	45.3	39.6
C 3-5 1	65	17.45	51.3	36.7	43.1	
C 3-5 2	66	17.30	46.8	36.0	36.6	39.9
D 3-5 1	75	17.60	48.4	36.3	39.3	
D 3-5 2	76	17.40	67.3	49.0	36.7	38.0
				BLOCK MEAN	40.4	
TREATMENT 4.						
A 4-5 1	47	17.90	48.5	31.0	57.2	
A 4-5 2	48	17.70	62.8	35.5	60.5	58.9
B 4 5 1	57	17.60	54.4	32.8	58.7	
B 4-5 2	58	17.80	67.0	41.4	52.0	55.4
C 4-5 1	67	17.10	58.0	35.0	56.2	
C 4-5 2	88	17.50	94.3	48.3	59.9	58.1
D 4-5 1	77	17.10	76.2	44.6	53.5	
D 4-5 2	78	17.40	62.7	37.4	55.8	54.7
				BLOCK MEAN	56.7	
TREATMENT 5.						
A 5-5 1	49	17.75	57.3	46.0	28.6	
A 5-5 2	50	17.50	43.6	36.0	29.1	28.8
B 5-5 1	59	17.70	35.6	29.8	32.4	
B 5-5 2	60	17.80	52.9	42.5	29.6	31.0
C 5-5 1	69	17.65	44.9	37.0	29.0	
C 5-5 2	70	17.50	44.5	36.8	28.5	28.8
D 5-5 1	79	17.40	47.8	40.5	24.0	
D 5-5 2	80	17.10	56.5	43.2	33.8	28.9
				BLOCK MEAN	29.4	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 30 1968 2 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-5A1	15	17.05	38.8	34.0	22.1	
A 1-5A2	16	16.55	39.5	35.5	17.4	19.7
B 1-5A1	19	16.45	46.6	40.2	21.2	
B 1-5A2	20	17.15	41.3	35.6	23.6	22.4
C 1-5A1	43	18.05	49.8	43.3	20.5	
C 1-5A2	44	17.90	43.4	38.5	19.2	19.8
D 1-5A1	47	17.90	42.6	37.6	20.2	
D 1-5A2	48	17.70	39.0	34.3	22.1	21.2
				BLOCK MEAN	20.8	
TREATMENT 5.						
A 5-5A1	17	16.45	55.5	46.0	24.3	
A 5-5A2	18	16.40	35.9	31.5	22.6	23.4
B 5-5A1	41	17.85	44.0	37.6	24.5	
B 5-5A2	42	18.05	43.2	36.9	25.0	24.8
C 5-5A1	45	17.85	56.1	45.9	26.7	
C 5-5A2	46	17.90	56.2	45.7	27.4	27.0
D 5-5A1	49	17.75	54.4	43.7	29.2	
D 5-5A2	50	17.50	46.6	39.3	25.1	27.1
				BLOCK MEAN	25.6	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 30 1968 4 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-5B1	2	16.70	37.5	34.1	16.3	
A 1-5B2	3	16.60	40.2	37.7	10.6	13.5
B 1-5B1	5	16.75	37.3	33.5	18.5	
B 1-5B2	6	16.60	34.8	32.3	13.7	16.1
C 1-5B1	9	17.05	51.2	45.4	17.0	
C 1-5B2	10	17.10	46.8	42.4	14.8	15.9
D 1-5B1	13	16.95	41.8	39.1	10.9	
D 1-5B2	14	16.95	46.8	42.4	14.7	12.8
				BLOCK MEAN	14.6	
TREATMENT 5.						
A 5-5B1	4	16.75	50.7	40.6	29.7	
A 5-5B2	1	16.60	48.4	38.7	30.5	30.1
B 5-5B1	7	16.55	49.0	39.5	29.3	
B 5-5B2	8	17.00	48.5	39.3	29.2	29.2
C 5-5B1	11	16.95	54.3	44.4	26.5	
C 5-5B2	12	17.05	53.4	41.4	33.0	29.8

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 30 1968 6 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-6 1	1	16.60	36.6	33.6	15.0	
A 1-6 2	2	16.70	31.7	29.7	13.3	14.2
B 1-6 1	11	16.95	56.8	50.7	15.3	
B 1-6 2	12	17.05	38.8	35.9	13.3	14.3
C 1-6 1	21	16.85	41.7	38.1	14.5	
C 1-6 2	22	16.80	37.8	34.8	14.3	14.4
D 1-6 1	31	16.50	34.0	32.0	11.4	
D 1-6 2	32	16.15	31.9	30.1	11.4	11.4
				BLOCK MEAN	13.6	
TREATMENT 2.						
A 2-6 1	3	16.60	37.4	34.7	13.0	
A 2-6 2	4	16.75	44.4	38.5	21.3	17.2
B 2-6 1	13	16.95	33.7	31.0	16.1	
B 2-6 2	14	16.95	42.9	37.9	19.3	17.7
C 2-6 2	23	16.75	36.1	32.8	17.1	
C 2-6 2	24	17.05	32.5	30.0	16.2	16.6
D 2-6 1	33	16.15	37.4	33.3	19.3	
D 2-6 2	34	16.00	35.4	32.7	13.9	16.6
				BLOCK MEAN	17.0	
TREATMENT 3.						
A 3-6 1	5	16.75	38.0	32.2	27.3	
A 3-6 2	6	16.60	59.4	44.6	34.6	30.9
B 3-6 1	17	16.45	49.0	39.0	30.7	
B 3-6 2	18	16.40	51.7	38.4	37.7	34.2
C 3-6 1	39	17.80	48.0	38.0	33.1	
C 3-6 2	40	16.90	51.6	38.2	38.6	35.9
D 3-6 1	35	16.10	43.4	34.4	33.0	
D 3-6 2	36	16.20	45.3	37.0	28.5	30.7
				BLOCK MEAN	32.9	
TREATMENT 4.						
A 4-6 1	7	16.55	63.0	36.6	56.8	
A 4-6 2	8	17.00	72.2	38.2	61.6	59.2
B 4-6 1	15	17.05	66.1	40.6	52.0	
B 4-6 2	16	16.55	61.0	38.0	51.7	51.9
C 4-6 1	27	17.10	58.3	36.1	53.9	
C 4-6 2	28	16.90	62.7	35.5	59.4	56.6
D 4-6 1	37	16.95	94.8	49.0	58.8	
D 4-6 2	38	17.20	56.5	36.0	52.2	55.5
				BLOCK MEAN	55.8	
TREATMENT 5.						
A 5-6 1	9	17.05	49.8	41.5	25.3	
A 5-6 2	10	17.10	49.2	39.9	29.0	27.2
B 5-6 1	19	16.45	59.4	48.8	24.7	
B 5-6 2	20	17.15	50.3	42.4	23.8	24.3
C 5-6 1	29	16.25	56.8	45.8	27.1	
C 5-6 2	30	16.30	59.4	44.8	33.9	30.5
D 5-6 1	25	17.15	43.3	35.7	29.1	
D 5-6 2	26	16.70	45.5	39.2	21.9	25.5
				BLOCK MEAN	26.8	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 30 1968 8 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-6A1	67	17.10	37.0	34.0	15.1	
A 1-6A2	68	17.45	34.8	32.5	13.3	14.2
B 1-6A1	71	17.45	48.5	42.6	19.0	
B 1-6A2	72	17.80	32.5	30.1	16.3	17.7
C 1-6A1	75	17.60	41.1	37.9	13.6	
C 1-6A2	76	17.40	40.9	37.9	12.8	13.2
D 1-6A1	79	17.40	42.0	38.4	14.6	
D 1-6A2	80	17.10	42.6	37.9	18.4	16.5
				BLOCK MEAN	15.4	
TREATMENT 5.						
A 5-6A1	69	17.65	46.8	38.2	29.5	
A 5-6A2	70	17.50	47.8	38.8	29.7	29.6
B 5-6A1	73	17.25	38.8	34.2	21.3	
B 5-6A2	74	17.50	49.2	40.7	26.8	24.1
C 5-6A1	77	17.10	55.0	43.4	30.6	
C 5-6A2	78	17.40	68.6	53.2	30.1	30.3
D 5-6A1	81	17.40	48.6	40.0	27.6	
D 5-6A2	82	17.35	38.8	34.2	21.4	24.5
				BLOCK MEAN	27.1	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 30 1968 10 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-6B1	41	17.85	43.4	37.0	25.0	
A 1-6B2	42	18.05	54.7	46.0	23.7	24.4
B 1-6B1	45	17.85	44.3	39.6	17.8	
B 1-6B2	46	17.90	54.2	46.9	20.1	18.9
C 1-6B1	49	17.75	38.7	34.3	21.0	
C 1-6B2	50	17.50	35.4	32.3	17.3	19.2
D 1-6B1	53	17.85	38.3	32.7	27.4	
D 1-6B2	54	17.35	46.0	40.0	20.9	24.2
				BLOCK MEAN	21.7	
TREATMENT 5.						
A 5-6B1	43	18.05	48.1	38.4	32.3	
A 5-6B2	44	17.90	60.3	45.0	36.1	34.2
B 5-6B1	47	17.90	52.1	40.2	34.8	
B 5-6B2	48	17.70	50.6	38.9	35.6	35.2
C 5-6B1	51	17.60	59.8	44.0	37.4	
C 5-6B2	52	17.50	61.7	48.1	30.8	34.1
D 5-6B1	55	17.65	45.0	36.1	32.5	
D 5-6B2	56	17.80	46.2	36.7	33.5	33.0
				BLOCK MEAN	34.1	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 31 1968 8 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-7 1	71	17.45	45.5	38.0	26.7	
A 1-7 2	72	17.80	46.0	39.0	24.8	25.8
B 1-7 1	81	17.40	54.0	45.0	24.6	
B 1-7 2	82	17.35	51.4	41.1	30.2	27.4
C 1-7 1	91	17.80	46.3	39.0	25.6	
C 1-7 2	92	17.45	58.3	48.0	25.2	25.4
D 1-7 1	11	16.95	39.1	34.1	22.6	
D 1-7 2	12	17.05	49.0	41.0	25.0	23.8
				BLOCK MEAN	25.6	
TREATMENT 2.						
A 2-7 1	73	17.25	44.5	38.4	22.4	
A 2-7 2	74	17.50	52.5	41.7	30.9	26.6
B 2-7 1	83	17.10	49.1	41.2	24.7	
B 2-7 2	84	17.10	58.0	46.0	29.3	27.0
C 2-7 1	100	17.45	50.1	41.4	26.6	
C 2-7 2	94	17.70	57.3	47.2	25.5	26.1
D 2-7 1	13	16.95	50.0	42.5	22.7	
D 2-7 2	14	16.95	61.5	51.6	22.2	22.5
				BLOCK MEAN	25.5	
TREATMENT 3.						
A 3-7 1	75	17.60	48.0	39.8	27.0	
A 3-7 2	76	17.40	46.3	39.4	23.9	25.4
B 3-7 1	85	17.20	59.4	49.3	23.9	
B 3-7 2	86	17.30	47.8	38.0	32.1	28.0
C 3-7 1	95	18.00	69.5	51.7	34.6	
C 3-7 2	93	17.85	51.5	41.1	30.9	32.7
D 3-7 1	15	17.05	45.0	38.1	24.7	
D 3-7 2	16	16.55	57.4	44.2	32.3	28.5
				BLOCK MEAN	28.7	
TREATMENT 4.						
A 4-7 1	77	17.10	56.0	34.5	55.3	
A 4-7 2	78	17.40	73.5	43.1	54.2	54.7
B 4-7 1	87	17.90	55.6	36.2	51.5	
B 4-7 2	88	17.50	59.0	41.3	42.7	47.1
C 4-7 1	97	17.40	59.4	45.3	33.6	
C 4-7 2	98	17.30	54.5	36.0	49.7	41.7
D 4-7 1	17	16.45	74.0	42.6	54.6	
D 4-7 2	18	16.40	63.0	41.4	46.4	50.5
				BLOCK MEAN	48.5	
TREATMENT 5.						
A 5-7 1	79	17.40	44.3	35.6	32.3	
A 5-7 2	80	17.10	42.5	35.5	27.6	30.0
B 5-7 1	89	17.80	52.7	41.2	33.0	
B 5-7 2	90	17.70	52.3	42.0	29.8	31.4
C 5-7 1	99	17.85	48.7	40.2	27.6	
C 5-7 2	96	17.80	50.0	41.2	27.3	27.4
D 5-7 1	19	16.45	46.2	38.5	25.9	
D 5-7 2	20	17.15	45.1	37.2	28.3	27.1
				BLOCK MEAN	29.0	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 31 1968 10 AM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-7A1	75	17.60	50.9	44.7	18.6	
A 1-7A2	76	17.40	32.2	29.9	15.5	17.1
B 1-7A1	79	17.40	40.5	36.3	18.2	
B 1-7A1	80	17.10	41.2	37.0	17.4	17.8
C 1-7A1	83	17.10	31.0	28.3	19.4	
C 1-7A2	84	17.10	39.0	34.9	18.7	19.1
D 1-7A1	87	17.90	43.8	39.2	17.8	
D 1-7A2	88	17.50	44.9	40.1	17.5	17.6
				BLOCK MEAN 17.9		
TREATMENT 5.						
A 5-7A1	77	17.10	35.8	31.0	25.7	
A 5-7A2	78	17.40	31.2	27.6	26.1	25.9
B 5-7A1	81	17.40	49.6	41.4	25.5	
B 5-7A2	82	17.35	44.8	36.1	31.7	28.6
C 5-7A1	85	17.20	40.0	34.7	23.2	
C 5-7A2	86	17.30	49.6	42.0	23.5	23.4
D 5-7A1	89	17.80	44.6	38.4	23.1	
D 5-7A2	90	17.70	63.4	52.8	23.2	23.2
				BLOCK MEAN 25.3		

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 31 1968 12 NOON

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-8 1	44	17.90	40.8	37.1	16.2	
A 1-8 2	46	17.90	37.0	34.4	13.6	14.9
B 1-8 1	56	17.80	38.3	35.8	12.2	
B 1-8 2	54	17.35	36.2	33.4	14.9	13.5
C 1-8 1	11	16.95	44.3	40.5	13.9	
C 1-8 2	28	16.90	46.4	41.7	15.9	14.9
D 1-8 1	32	16.15	39.4	36.0	14.6	
D 1-8 2	37	16.95	45.2	41.5	13.1	13.9
				BLOCK MEAN	14.3	
TREATMENT 2.						
A 2-8 1	39	17.80	43.0	39.0	15.9	
A 2-8 2	51	17.60	46.1	39.9	21.8	18.8
B 2-8 1	50	17.50	42.0	38.9	12.7	
B 2-8 2	52	17.50	41.2	37.4	16.0	14.3
C 2-8 1	13	16.95	34.3	31.5	16.1	
C 2-8 2	17	16.45	31.9	29.1	18.1	17.1
D 2-8 1	55	17.65	38.1	35.4	13.2	
D 2-8 2	34	16.00	33.9	30.9	16.8	15.0
				BLOCK MEAN	16.3	
TREATMENT 3.						
A 3-8 1	53	17.85	44.8	37.3	27.8	
A 3-8 2	27	17.10	49.8	40.8	27.5	27.7
B 3-8 1	42	18.05	50.2	40.2	31.1	
B 3-8 2	48	17.70	50.2	41.0	28.3	29.7
C 3-8 1	14	16.95	43.2	37.0	23.6	
C 3-8 2	29	16.25	42.0	35.0	27.2	25.4
D 3-8 1	35	16.10	50.3	41.5	25.7	
D 3-8 2	36	16.20	48.5	40.0	26.3	26.0
				BLOCK MEAN	27.2	
TREATMENT 4.						
A 4-8 1	24	17.05	52.9	36.4	46.0	
A 4-8 2	21	16.85	56.3	38.5	45.1	45.6
B 4-8 1	43	18.05	50.2	36.7	42.0	
B 4-8 2	45	17.85	63.0	42.7	45.0	43.5
C 4-8 1	30	16.30	59.4	41.7	41.1	
C 4-8 2	25	17.15	54.5	39.6	39.9	40.5
D 4-8 1	27	17.10	47.0	33.4	45.5	
D 4-8 2	33	16.15	50.1	35.9	41.8	43.7
				BLOCK MEAN	43.3	
TREATMENT 5.						
A 5-8 1	26	16.70	44.5	39.0	19.8	
A 5-8 2	22	16.80	51.3	44.4	20.0	19.9
B 5-8 1	40	16.90	39.9	35.9	17.4	
B 5-8 2	49	17.75	49.5	43.0	20.5	18.9
C 5-8 1	23	16.75	40.5	35.0	23.2	
C 5-8 2	5	16.75	43.6	38.4	19.4	21.3
D 5-8 1	38	17.20	53.1	46.0	19.8	
D 5-8 2	47	17.90	41.9	38.1	15.8	17.8
				BLOCK MEAN	19.5	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 31 1968 2 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-8A1	59	17.70	31.9	29.8	14.8	
A 1-8A2	60	17.80	27.6	26.2	14.3	14.5
B 1-8A1	63	17.90	45.7	41.0	16.9	
B 1-8A2	64	17.70	33.6	31.2	15.1	16.0
C 1-8A1	67	17.10	32.0	29.7	15.4	
C 1-8A2	68	17.45	40.0	36.9	13.7	14.6
D 1-8A1	71	17.45	40.1	36.5	15.9	
D 1-8A2	72	17.80	42.3	38.4	15.9	15.9
				BLOCK MEAN	15.3	
TREATMENT 5.						
A 5-8A1	61	17.70	45.0	39.1	21.6	
A 5-8A2	62	17.65	34.8	31.3	20.4	21.0
B 5-8A1	65	17.45	46.2	40.9	18.4	
B 5-8A2	66	17.30	34.1	31.3	16.7	17.6
C 5-8A1	69	17.65	38.2	35.0	15.6	
C 5-8A2	70	17.50	38.2	34.9	15.9	15.8
D 5-8A1	73	17.25	45.0	40.7	15.5	
D 5-8A2	74	17.50	38.5	35.5	14.3	14.9
				BLOCK MEAN	17.3	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 31 1968 4 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITI- AL WT. GMS.	FINAL WT. GMS.	MOIS- TURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-8B1	1	16.60	33.8	31.3	14.5	
A 1-8B2	9	17.05	49.3	45.2	12.7	13.6
B 1-8B1	5	16.75	40.6	37.4	13.4	
B 1-8B2	6	16.60	38.6	35.4	14.5	14.0
C 1-8B1	14	16.95	38.4	35.7	12.6	
C 1-8B2	10	17.10	40.1	37.1	13.0	12.8
D 1-8B1	13	16.95	45.8	42.6	11.1	
D 1-8B2	16	16.55	42.1	38.4	14.5	12.8
				BLOCK MEAN	13.3	
TREATMENT 5.						
A 5-8B1	3	16.60	30.0	28.4	11.9	
A 5-8B2	4	16.75	33.1	30.4	16.5	14.2
B 5-8B1	7	16.55	39.4	36.4	13.1	
B 5-8B2	8	17.00	31.0	28.9	15.0	14.1
C 5-8B1	11	16.95	51.4	47.2	12.2	
C 5-8B2	12	17.05	34.6	32.2	13.7	12.9
D 5-8B1	15	17.05	39.9	37.2	11.8	
D 5-8B2	2	16.70	37.7	34.3	16.2	14.0
				BLOCK MEAN	13.8	

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 31 1968 4 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-8B1	1	16.60	33.8	31.3	14.5	
A 1-8B2	9	17.05	49.3	45.2	12.7	13.6
B 1-8B1	5	16.75	40.6	37.4	13.4	
B 1-8B2	6	16.60	38.6	35.4	14.5	14.0
C 1-8B1	14	16.95	38.4	35.7	12.6	
C 1-8B2	10	17.10	40.1	37.1	13.0	12.8
D 1-8B1	13	16.95	45.8	42.6	11.1	
D 1-8B2	16	16.55	42.1	38.4	14.5	12.8
				BLOCK MEAN 13.3		
TREATMENT 5.						
A 5-8B1	3	16.60	30.0	28.4	11.9	
A 5-8B2	4	16.75	33.1	30.4	16.5	14.2
B 5-8B1	7	16.55	39.4	36.4	13.1	
B 5-8B2	8	17.00	31.0	28.9	15.0	14.1
C 5-8B1	11	16.95	51.4	47.2	12.2	
C 5-8B2	12	17.05	34.6	32.2	13.7	12.9
D 5-8B1	15	17.05	39.9	37.2	11.8	
D 5-8B2	2	16.70	37.7	34.3	16.2	14.0
				BLOCK MEAN 13.8		

PERCENTAGE MOISTURE CONTENT OF HAY
FIRST CUT MR. LEGAULT'S FARM JULY 31 1968 6 PM

SAMPLE NO.	DISH NO.	DISH WT. GMS.	INITIAL WT. GMS.	FINAL WT. GMS.	MOISTURE PCT.	SAMPLE MEAN PCT.
TREATMENT 1.						
A 1-9 1	1	16.60	38.0	35.2	13.1	
A 1-9 2	2	16.70	32.4	30.0	15.3	14.2
B 1-9 1	11	16.95	36.8	34.5	11.6	
B 1-9 2	12	17.05	34.2	31.7	14.6	13.1
C 1-9 1	21	16.85	40.1	36.9	13.8	
C 1-9 2	22	16.80	32.4	30.1	14.7	14.3
D 1-9 1	31	16.50	30.8	29.0	12.6	
D 1- 2	32	16.15	32.5	30.2	14.1	13.3
				BLOCK MEAN	13.7	
TREATMENT 2.						
A 2-9 1	3	16.60	38.4	34.9	16.1	
A 2-9 2	4	16.75	46.8	41.0	19.3	17.7
B 2-9 1	13	16.95	34.3	32.0	13.3	
B 2-9 2	14	16.95	41.0	36.3	19.5	16.4
C 2-9 1	23	16.75	37.9	34.8	14.7	
C 2-9 2	24	17.05	40.6	37.1	14.9	14.8
D 2-9 1	33	16.15	39.2	35.8	14.8	
D 2-9 2	34	16.00	38.0	34.5	15.9	15.3
				BLOCK MEAN	16.0	
TREATMENT 3.						
A 3-9 1	5	16.75	42.5	36.5	23.3	
A 3-9 2	6	16.60	37.4	32.1	25.5	24.4
B 3-9 1	15	17.05	35.5	31.1	23.8	
B 3-9 2	16	16.55	43.2	37.0	23.3	23.6
C 3-9 1	25	17.15	43.0	36.8	24.0	
C 3-9 2	26	16.70	37.2	33.1	20.0	22.0
D 3-9 1	35	16.10	40.1	35.2	20.4	
D 3-9 2	36	16.20	42.5	36.5	22.8	21.6
				BLOCK MEAN	22.9	
TREATMENT 4.						
A 4-9 1	7	16.55	59.7	41.5	42.2	
A 4-9 2	8	17.00	53.8	37.8	43.5	42.8
B 4-9 1	17	16.45	50.6	36.4	41.6	
B 4-9 2	18	16.40	49.0	34.9	43.3	42.4
C 4-9 1	31	16.50	46.1	35.0	37.5	
C 4-9 2	28	16.90	48.7	35.8	40.6	39.0
D 4-9 1	37	16.95	70.6	48.6	41.0	
D 4-9 2	38	17.20	75.0	52.7	38.6	39.8
				BLOCK MEAN	41.0	
TREATMENT 5.						
A 5-9 1	9	17.05	49.5	43.5	18.5	
A 5-9 2	10	17.10	43.0	39.0	15.4	17.0
B 5-9 1	19	16.45	35.9	32.7	16.5	
B 5-9 2	20	17.15	32.2	29.9	15.3	15.9
C 5-9 1	29	16.25	33.3	30.4	17.0	
C 5-9 2	30	16.30	40.1	36.7	14.3	15.6
D 5-9 1	39	17.80	32.6	30.0	17.6	
D 5-9 2	40	16.90	33.2	30.3	17.8	17.7
				BLOCK MEAN	16.5	