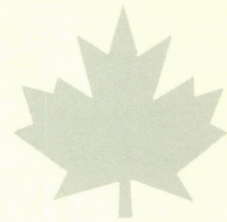


CANADIAN AGRICULTURAL ENGINEERING

C
S
A
E



S
C
G
R

The Journal of the Canadian Society of Agricultural Engineering
La Revue de la Société Canadienne du Génie Rural

CONTENTS

THE THRESHOLD OF COMMITMENT TO CANADIAN AGRICULTURE Jacob (Jack) Pos	56
EFFECTS OF MOISTURE CONTENT ON CORN SILAGE DENSITY AND STORAGE LOSSES IN A LARGE TOWER SILO H.A. Jackson and J.R. Lessard	57
CORROSION PROTECTION FOR CONCRETE FARM SILOS J.C. Jofriet	59
DESIGN CONCEPTS AND CONSTRUCTION COSTS OF EIGHT DIFFERENT MANURE STORAGEES J.E. Turnbull, P.A. Phillips, and F.R. Hore	65
A NEW METHOD OF ANALYSIS FOR HAY DRYING WEATHER J.A. Dyer and I.S. Selirio	71
DATA ACQUISITION SYSTEM FOR MEASURING ENVIRONMENTAL VARIABLES WITHIN CONFINEMENT ANIMAL UNITS J.J.R. Feddes and J.B. McQuitty	75
IMPROVEMENTS IN SPECTRAL REFLECTANCE OF FIELD CROPS E.J. Brach, R.W. Tinker, and G.T. St. Amour	78
AGRICULTURAL BIOMASS WASTES: UTILIZATION ROUTES G.E. Timbers and C.G.E. Downing	84
MOBILE LIMB SHAKER FOR APPLE HARVESTING J.G. Kemp and B.A. Melanson	88
SILAGE PRESSURES IN TOWER SILOS. PART 1. THEORETICAL AND DESIGN CONSIDERATIONS S.C. Negi and J.R. Ogilvie	92
SILAGE PRESSURES IN TOWER SILOS. PART 2. MEASUREMENT OF PHYSICAL PROPERTIES AND EFFECT OF SILO CHARACTERISTICS S.C. Negi, J.R. Ogilvie, and E.R. Norris	98
SILAGE PRESSURES IN TOWER SILOS. PART 3. EXPERIMENTAL MODEL STUDIES AND COMPARISON WITH SOME SILO THEORIES S.C. Negi, J.R. Ogilvie, and E.R. Norris	107
SOIL-ASPHALT MIXTURE FOR CANAL SEEPAGE CONTROL: LABORATORY STUDY Theron G. Sommerfeldt	111
RUNOFF FROM FEEDLOTS AND MANURE STORAGEES IN SOUTHERN ONTARIO D.R. Coote and F.R. Hore	116
THE EFFECT OF ANAEROBIC DIGESTION UPON SWINE MANURE ODORS F.W. Welsh, D.D. Schulte, E.J. Kroeker, and H.M. Lapp	122
AN ADJUSTABLE WATER DISPENSER FOR CONDITIONING TOBACCO IN EXPERIMENTAL CHAMBERS W.S. Reid and L.S. Vickery	127

CANADIAN AGRICULTURAL ENGINEERING

DECEMBER 1977
VOLUME 19 NO. 2

EDITOR

H.C. KORVEN
Research Station, Agriculture Canada
Swift Current, Saskatchewan S9H 3X2

ASSOCIATE EDITORS

J.S. TOWNSEND (*Power & machinery*)
Department of Agricultural Engineering
University of Manitoba
Winnipeg, Manitoba R3T 2N2

T.G. SOMMERFELDT (*Soil & water*)
Research Station
Research Branch, Agriculture Canada
Lethbridge, Alberta T1J 4B1

J.R. OGILVIE (*Structures & environment*)
School of Engineering
University of Guelph
Guelph, Ontario N1G 2W1

G.E. TIMBERS (*Electrical power & processing*)
Engineering Research Service
Research Branch, Agriculture Canada
Ottawa, Ontario K1A 0C6

CSAE COUNCIL 1977-78

JACK POS President
School of Engineering
University of Guelph
Guelph, Ontario N1G 2W1

HERB LAPP Past President
Department of Agricultural Engineering
University of Manitoba
Winnipeg, Manitoba R3T 2N2

GARLAND LALIBERTE President-Elect
31 Briarcliff Bay
Winnipeg, Manitoba R3T 3H8

JOHN TURNBULL Vice-President
(Technical)
Engineering Research Service
Research Branch, Agriculture Canada
Ottawa, Ontario K1A 0C6

BOB RAE Vice-President
(Regional)
c/o Agricultural Extension Centre
1129 Queens Avenue
Brandon, Manitoba R7A 1L9

Regional Directors

ALLAN MCMECHAN British Columbia
Research Station, Agriculture Canada
Summerland, British Columbia V0H 1Z0

PAUL BARLOTT Alberta
Systems Engineering Branch, Alberta Agriculture
9718-107th Street
Edmonton, Alberta T5K 2C8

MARTIN WRUBLESKI Saskatchewan
Agricultural Engineering Services Branch
Saskatchewan Department of Agriculture
Regina, Saskatchewan S4S 0B1

MIKE VAN DEN BOSCH Manitoba
Box 7, Building 7, 139 Tuxedo Avenue
Winnipeg, Manitoba R3C 0V8

LORNE HESLOP Ontario
McKee Brothers
Elmira, Ontario

DAVID FISK Québec
Ministère de l'Agriculture et de la Colonisation
Buckingham, Québec

RANDY TRENHOLM Atlantic Provinces
100 Landsdowne Street
Fredericton, New Brunswick E3B 1T4

ROBERT V. JUNG Secretary-Treasurer
Ridgetown College of Agriculture
and Technology (RCAT)
Ridgetown, Ontario N0P 2C0

Ex-Officio Member
RONALD ROBINSON AIC National Council
Council of Forest Industries of
British Columbia Representative
1500/1055 West Hastings Street
Vancouver, British Columbia V6E 2H1

THE THRESHOLD OF COMMITMENT TO CANADIAN AGRICULTURE

Jacob (Jack) Pos

Founding Member C.S.A.E.

The Canadian Society of Agricultural Engineering (C.S.A.E.) has made considerable progress since its first annual meeting on the campus of the University of Manitoba, Winnipeg, in June 1958. Its total membership has grown over 500 percent and now, some 20 years later, numbers 661. During this development period there were many discussions concerning our affiliation with the Agricultural Institute of Canada (A.I.C.). There were many of us, myself included, who were of the opinion that the services provided were not commensurate with the charges levied, nor were we satisfied with unequal representation on the National Council.

Since many of the members were also members of the American Society of Agricultural Engineers (A.S.A.E.) and most of them attended one or more of its annual or regional meetings, it was considered to be of greater benefit to become a Canadian affiliate of the A.S.A.E. Similarly, others who held membership in the Engineering Institute of Canada felt that as agricultural engineers we should be making our contribution through the engineering profession within Canada, and still others thought we should be completely independent. Apparently we were not making any real progress in any direction and a committee was subsequently appointed to bring forth a recommendation at the next annual meeting to be held in Charlottetown, in 1972.

From the recommendations brought forth by this committee, it was generally agreed, in principle, that we could make our best contribution to Canadian agriculture by working together with other Canadian scientific agricultural societies as an affiliate body of the A.I.C. In the meantime, first through the efforts of Garland Laliberte and then Ron Robinson, our Society delegates to the Executive Council of the A.I.C., our concerns have been recognized and in the new restructuring of the A.I.C., these concerns have been met. Now we can have a greater opportunity to influence the future development of this very significant component of the agricultural industry in Canada.

By now you will have received detailed information concerning the restructuring and our involvement in the A.I.C., as well as a letter ballot. I hope you have reviewed this material carefully. The subject was discussed at the recent annual meeting of our Society in Guelph and given unanimous support in principle. In addition to obtaining all that we have asked for in being granted equal representation with the Provincial Institutes, the A.I.C. has the resources and the influence to speak on behalf of Canadian agriculture, and the C.S.A.E. should participate in formulating A.I.C. policy on national issues. Furthermore, the opportunity is provided for joint technical sessions with other research scientists. Also, full membership in A.I.C. provides subscriptions to such A.I.C. publications as the *Agrologist* and *Agronews*.

On this important threshold in our young history, let us be ever mindful of our commitment to Canadian agriculture by cooperating with other agricultural disciplines in the formation of an active and progressive new Scientific Policy and Coordinating Committee in full partnership with the Professional Coordinating Committee within the newly restructured National Council of the Agricultural Institute of Canada.

Canadian Agricultural Engineering publishes papers covering the general field of Agricultural Engineering that fit into one of the following classifications: 1) a scientific paper based on original research; 2) a technical paper based on design, development, testing, or analysis of machines, equipment, structures, processes, or practice; 3) a general paper on education relative to curricula and philosophy or trends in science, on a survey or investigation of some phase of research or research methods, or on extension or extension methods. The Editorial Board may also publish abstracts of papers published elsewhere and interesting news items of members of Agricultural Engineering.

Manuscripts for publication should be submitted to the Chairman of the Editorial Board. The papers must be original and must not have been published elsewhere or copyrighted. The author, not the CSAE, is responsible for opinions expressed. Information published in *Canadian Agricultural Engineering* may be quoted in whole or in part provided that credit is given to the author and to the journal. Information on page, reprint, and other charges may be obtained from members of the Board.

The financial support of the National Research Council of Canada toward the publication of this journal is gratefully acknowledged.

Central Office Address: Suite 907, 151 Slater Street, Ottawa, Ontario K1P 5H4
Published Semi-Annually (June and December)

Subscription Rate: \$8.00 per annum in Canada; \$9.00 per annum in other countries;
single issue \$5.00

NOTES TO CONTRIBUTORS

The Editorial Board will assess suitability and essential detail of papers submitted for publication in *Canadian Agricultural Engineering*. One or more reviewers will be used. Their comments and suggestions will be compiled and submitted to the author. The review will ensure that:

1. A research paper does represent a piece of research carried to a well-defined stage of advancement and that the conclusions are adequately supported by the experimental results.
2. A technical paper represents a clear, concise, and factual outline and interpretation of the development, design, test, or analysis under consideration and that it is a contribution in the field of agricultural engineering.
3. A general paper on education, research, or extension is pertinent to major changes in curricular, research, or extension or to forward-looking developments in these areas.
4. A technical note, of one journal page or less, on equipment development, technique of measurement, or method of analysis will have application for other workers in the field of agricultural engineering.

MANUSCRIPT

The manuscript should be typed double-spaced on paper 8-1/2 x 11 inches (21.6 x 27.9 cm) with margins not less than 1-1/4 inches (3.3 cm). The first page should contain only the title, authors' names, addresses (including postal codes), and contribution number where applicable. Tables and captions for illustrations should be on separate pages, placed after the text. Manuscript paper with numbered lines is preferred. The original and two copies are required.

The title of the paper should be capitalized and centered on the page; it should give an accurate description of the article, using key words that can be used for computer-indexing.

ORGANIZATION

The paper should be organized to conform with present Journal practice. *Research* and *technical* papers must

include a short abstract section of about 200 words.

Major headings – Center on the page with all words in capital letters.

Subheadings – Start at left-hand margin, capitalize first letter of major words.

Sub-subheadings – Start at left-hand margin, in lower case except first letter of first word, and underline.

Technical and detailed information should be included only in the form of description, table, graph, chart, or photograph. In general, follow the *Council of Biological Editors Style Manual*, 3rd ed., published by the American Institute of Biological Sciences, 1401 Wilson Boulevard, Arlington, Va. 22209.

References

List references alphabetically by authors at the end. Include year of publication, title in lower case except first letter of first word, and source, with volume and page numbers where applicable. Names of periodicals should be abbreviated in the form given in *BIOSIS List of Serials with Title Abbreviations* (Bioscience Information for Service of Biological Abstracts, 211 Arch Street, Philadelphia, Pa. 19102). Material in press, with the name of the journal, may be used as a reference. Private communications and unpublished reports should be referred to in parentheses in the text. Avoid the use of footnotes where possible. Use the author-date system in the manuscript when referring to articles in the Reference section.

Tables

Designate tables at the top by table number (Roman numerals) and title, all in capital letters. All headings and other information in tables are to be in lower case except first letter of first word. Keep the table compact and place it across the page wherever possible. Do not use vertical lines.

Measurements

Use the metric system (SI) in the text. Tables, charts and graphs should be given only in metric units.

Equations

Equations and formulas must be set up clearly. Use capitals for symbols as much as possible and lower case for superscripts and subscripts. Greek and other characters should be identified clearly. Equations should be numbered on the right-hand margin in large numbers and in line with the center of the equation.

Abbreviations

For commonly used terms, consult the *CBE Style Manual*. Abbreviate units of measures only when used with numerals. Do not use abbreviations in the title. Normally, numbers less than 10 should be spelled out, e.g. six.

Paragraphs

If paragraphs are to be numbered, designate by arabic numerals. Designate sub-paragraphs by lower case letters in parentheses.

ILLUSTRATIONS

An illustration or a group of them should be planned to fit, after reduction, into a space equal in width to that occupied on the journal page by one column (preferred) or two or three columns if necessary. The original should not be more than three times the size of the final reproduction. For identification, the figure number, author's name, and paper title should be written lightly in the lower left corner of a photograph. Use a soft lead pencil. Photographs should be printed on glossy paper with strong contrasts approximately 5 x 7 inches (12.7 x 17.8 cm) in size. *One set is required for each copy of the paper.*

Line drawings

Make line drawings in india ink on plain or blue-lined paper or other suitable material. Letters, numerals, labels and axis captions should be made in capital size with a lettering guide (*not a typewriter*). They should be large enough that the smallest character will not be less than 1 mm high when reduced. Type the figure numbers and captions on a separate page. *One set of clear copies is required with each copy of the paper. The original drawings must be provided when the paper is accepted for printing.*