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# CANADA AGRICULTURE



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# CANADA'S SKILLED SEED GROWERS.



D. W. MacDONALD

Les producteurs de semence manifestent un intérêt croissant pour la multiplication des nouvelles variétés fourragères dans le cadre du Programme canadien de semences fourragères.

The Canadian Forage Seed Project has fought an up-hill battle for years. But the scheme that launched Climax timothy on a career that spanned continents and brought millions in export trade now seems keyed to attain further objectives. It has reached the point where progress should be an easier factor to

measure, Project Chairman R. G. Savage believes, but not necessarily easier to achieve.

Growers are showing firm interest in producing pedigree seed on contract with the seed trade. They are prepared to engage in the specialized work of pedigree seed production. But, the export market for certain Canadian forage seeds is becoming more competitive, and restricted, and it's a question whether Canadian grown brome or Climax will be acceptable in foreign countries in future. Traditional markets are placing restrictions on uncertified grades, and named varieties not officially tested and approved for crop production.

"Judging by the recent trend in Western European countries to restrict imports of grass and legumes to certified seed of their recommended varieties, Canada's traditional export of commercial seed to Europe is going to be drastically reduced in the next few years", R. G. Savage, Chief of CDA's Plant Products Seed Section observes. "If we are to

Mr. MacDonald is with the CDA Information Division, Ottawa, Ont.

# CANADIAN FORAGE SEED PROJECT VARIETIES

Variety, origin and Year under Project	Objective 1969 lbs.	Certified Seed Sealed 1967-68 lbs.	Acres Inspected 1968-69	Price Foundation Seed 1969	Remarks on Status
Climax Timothy (1952) CDA, Ottawa.	4,000,000	2,911,538	20,166	.50	Still number 1. Objective normally achieved.
Bounty Timothy (1966) CDA, Ottawa.	200,000	1,895	139	1.00	Late maturing, for Maritime conditions.
Champ Timothy (1966) CDA, Ottawa	2,000,000	3,002	121	1.00	The new timothy for aftermath.
Carleton brome-grass (1961) CDA, Saskatoon.	1,000,000	105,549	3,070	1.00	Northern type for cold dry conditions.
Magna brome-grass (1967) CDA, Saskatoon.	1,000,000	—	6	1.00	Southern leafy type for northern conditions.
Red Patch brome-grass (1964) CDA, Ottawa.	150,000	1,747	991	1.00	Vigorous southern type with aftermath quality. Recommended in Ontario.
Ensign meadow fescue (1962) CDA, Ottawa.	—	38,990	1,023	.40	Exportable commodity at right price. Phasing out.
Chief Intermediate Wheatgrass (1961) CDA, Saskatoon.	100,000	21,270	123	.50	Phasing out.
Summit Crested wheatgrass (1961) CDA, Saskatoon.	400,000	2,942	399	.75	
Sawki Russian wild ryegrass (1962) CDA, Swift Current.	300,000	37,777	616	1.00	Improved Prairie pasture grass.
Rideau orchard grass (1962) CDA, Ottawa.	50,000	924	319	.60	Hardy, for well managed pastures.
Trader meadow fescue (1964) CDA, Ottawa.	1,000,000	12,366	280	.40	Exportable commodity at right price. Phasing out.
Norlea perennial ryegrass (1962) CDA, Ottawa.	500,000	202,950	703	1.00	There is demand for this fine textured lawn grass from United States.
Orbit tall wheatgrass (1965) CDA, Swift Current.	100,000	6,600	84	1.00	Hay or pasture grass for saline, wet soils.
Greenleaf pubescent (1966) wheatgrass CDA, Lethbridge.	100,000	—	18	1.00	
Boreal creeping red fescus (1966) CDA, Beaverlodge	1,000,000	—	487	1.00	Exportable commodity at right price.
Ottawa red clover (1962) CDA, Ottawa.	250,000	9,400	209	1.00	Seed setting difficulties in Canada.
Altaswede red clover (1962) University of Alberta, Edmonton.	—	5,400	158	.75	Competes with high performance European varieties multiplied in Canada under OECD arrangements.
Beaver Alfalfa (1961) CDA, Saskatoon.	100,000	10,018	968	1.50	
Rambler alfalfa (1961) CDA, Swift Current.	300,000	35,480	1,866	1.50	Creeping rooted, dry land. Seed setting difficulties.
Roamer alfalfa (1966) CDA, Swift Current.	—	—	102	1.50	Creeping rooted, bacterial wilt resistant. Seed setting difficulties.
Aurora alsike (1964) CDA, Beaverlodge, Alta.	—	2,642	303	.60	
Leo birdsfoot trefoil (1963) Macdonald College, Que.	100,000	406	170	—	In demand. Price of breeder. seed set by private institution. No allocation in 1969.
Erector sweet clover (1962) CDA, Brandon.	100,000	100	—	—	Yellow flowered. No allocation in 1969.

retain our trade with Western Europe we must work towards the production of pedigree seed of varieties they will accept”.

The Canadian Forage Seed Project which came into effect in 1951 coordinates the work of plant breeders, government production and inspection services, provincial extension services and the seed trade in promoting named varieties of forage. The Canada Department of Agriculture underwrites the administrative costs of the Project.

Prior to the Canadian Forage Seed Project, new varieties of forage crops were virtually lost, according to Mr. Savage. Efforts by plant breeders to have their varieties multiplied and put in general use were unsuccessful. There was a general lack of interest on the part of farmers, there was no incentive for seed growers and since there was no seed available, the seed trade could hardly be expected to show any concern. Extension agriculturists could do little to promote new varieties when there was no seed available. Plant breeders were not in a position to take on the production of seed because to do so would mean a curtailment of their research.

A number of factors contributed to this situation and all of these pointed to the need for a fully coordinated plan to ensure adequate supplies of all necessary pedigree seed classes, together with an extension program to make farmers aware of the improved varieties.

Throughout the operation of the Project, the sole objective has been to encourage the production, distribution, continuity of supply, and limited stockpiling of Breeder and Foundation stocks of recommended varieties of forage crops.

In the beginning all Foundation seed was allocated to growers through the provincial departments of agriculture. Since 1963 members of the seed trade were allowed access to 50 per cent of the Foundation seed supplies for private increase. The seed multiplication division of the Canadian Seed Trade Association receives the allotment for division among member companies.

There is a trend toward fewer requests from growers through their provincial representatives and more than 50 per cent of the total Foundation seed supply has been made available to the seed trade.

Eighty-five per cent of the Foundation seed allocated by the Canadian Forage Seed Project in 1968 went to the commercial seed trade according to H. R. Parnell, Assistant Chief, Seeds Section, Plant Products Division. Sixty thousand pounds of a total 70,000 lb. of Foundation seed sold for increase went to the seed trade. Seed firms in turn let it out on contract to growers for increase to Certified.

The remaining 15 per cent was available to growers through provincial department of agriculture representatives on the Project Committee. Growers in

this case faced the prospect of finding their own market without benefit of specialized facilities offered by the seed trade.

The Project buys all the breeder seed it requires from the institution that maintains the breeder stock. It distributes Breeder seed among qualified Foundation seed growers at cost, and contracts to buy back the increase at a margin above the average selling price of Certified seed of that crop or variety.

This is to provide an incentive for the growers who are producing the seed on a contract basis. The Project then allocates the supply of Foundation seed to the provinces or seed trade and has no further direct control over the increase or handling. Certified seed growers normally secure Foundation seed for increase to certified at cost, plus cost of handling, from their provincial department, or on contract with a seed dealer. The Project itself attempts to operate on a break even basis.

In 1968 there were agreements with 52 highly skilled Foundation seed growers to deliver seed in

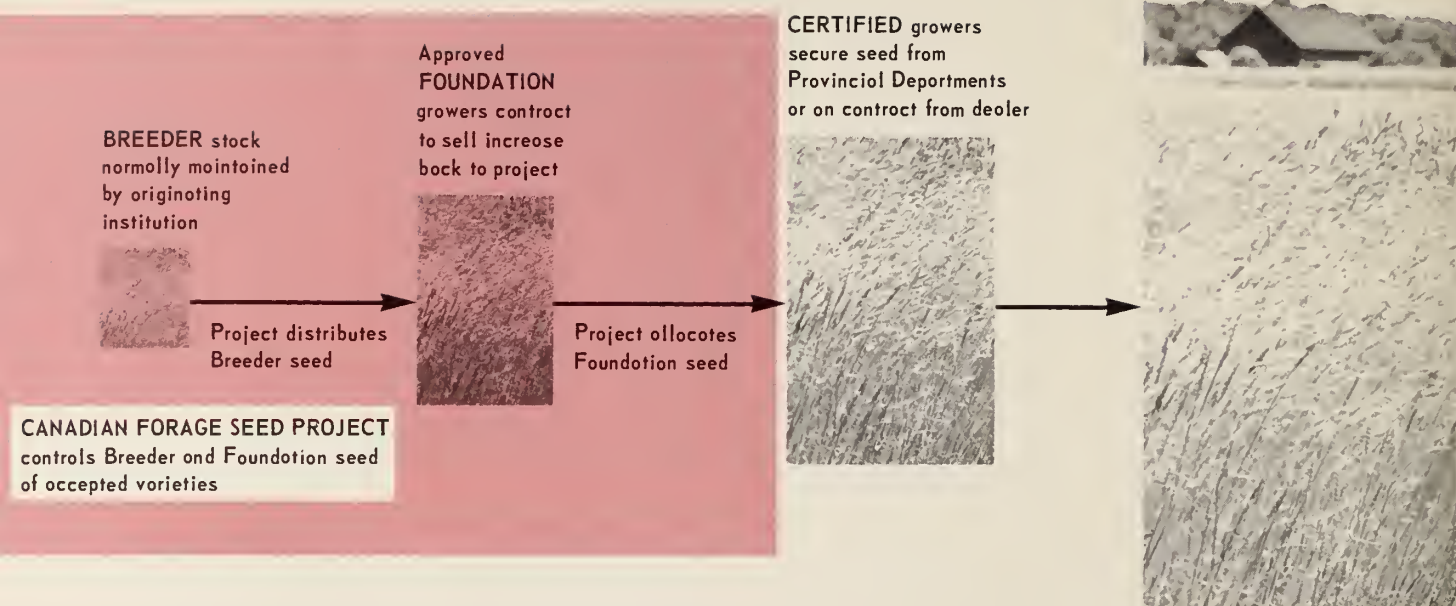


*Combine harvests breeder plot of new strain of orchard grass.*

1968 and up to 1972 in some cases depending on the length of the stand. Most Foundation growers were located in Western Canada, with 10 in Manitoba, 15 in Saskatchewan, 18 in Alberta, 6 in Ontario and one each in New Brunswick, Quebec and British Columbia.

Contracts for Certified seed production from Foundation seed vary with the seed dealer. Generally, there are no price guarantees, in order to keep the deal competitive. The company may pass the Foundation seed on to the grower at the Project price, plus the cost of transportation and handling. The grower agrees to inspection, carried out by the Plant Products Division, and abides by the regulations of the Canadian Seed Growers Association.

# FORAGE SEED INCREASE



The grower receives guidance in handling the crop and may in some contracts have the option to accept a price at harvest, based on the market price, or holding till the final settlement date. The company may advance up to two-thirds of the current price pending final settlement. Growers may be given an estimate of dockage before final cleaning.

The Project, Committee Chairman Savage relates, sets objectives based on anticipated needs and demands for seed at the certified level for the various varieties under the program. In allocating seed, however, there is no certainty that it is all planted and that conditions will result in a crop as predicted. The program has also been hampered by incomplete information on production and handling of seed in the year it is allocated to the provinces or seed trade. Present information is based on figures obtained after the crops have come up for inspection.

The accompanying table shows the objective and status of varieties under the Project (See page 4).

Normally, the annual Foundation seed allocation is the amount of Foundation seed required to plant the same amount of acreage that has to be terminated in a given year. However, in the case of new varieties requiring rapid multiplication, or where the objective for a variety is raised, additional quantities of Foundation seed are released according to need. The Project similarly has the opportunity to reduce the annual allocation of Foundation seed when an

## MEMBERS OF SEED MULTIPLICATION DIVISION OF THE CANADIAN SEED TRADE ASSOCIATION

Alberta Wheat Pool.....	Calgary, Alta.
Bishop Seeds Ltd.....	Belleville, Ont.
Brett-Young Seeds Ltd.....	Winnipeg, Man.
Fred Brown Seeds Ltd.....	Arkona, Ont.
Buckerfields Ltd.....	New Westminster, B.C.
Canwest Seed Co.....	Edmonton, Alta.
Early Seed & Feed Ltd.....	Saskatoon, Sask.
Federal Grain Ltd.....	Winnipeg, Man.
Hogg & Lytle Seeds.....	Oakwood, Ont.
Imperial Seed Co. Ltd.....	Winnipeg, Man.
Jones, MacNaughton Seeds Ltd.....	Exeter, Ont.
Manitoba Pool Elevators.....	St. Boniface, Man.
Maple Leaf Seeds.....	Edmonton, Alta.
McCabe Seeds Ltd.....	Winnipeg, Man.
A. E. McKenzie Co. Ltd.....	Brandon, Man.
Newfield Seeds Ltd.....	Nipawin, Sask.
Northern Sales (1963) Ltd.....	Winnipeg, Man.
Ontario Seed Cleaners & Dealers Ltd...	Brampton, Ont.
Parsons Seeds Ltd.....	Beeton, Ont.
Otto Pick & Sons Seeds Ltd.....	Richmond Hill, Ont.
Pritchard Seed Ltd.....	Harriston, Ont.
Quebec Seed Ltd.....	Montreal, P.Q.
Saskatchewan Wheat Pool.....	Regina, Sask.
Steele Briggs Seeds.....	Toronto, Ont.
Steele, Robertson Ltd.....	Edmonton, Alta.
Alex M. Stewart & Son Ltd.....	Ailsa Craig, Ont.
United Co-ops of Ont.....	Weston, Ont.
United Grain Growers Ltd.....	Winnipeg, Man.

objective is being reduced or when there is sufficient acreage already planted to meet the Certified seed objective.

Crops for Certified status must be established on land which has not grown crops of the same kind in the preceding two years, except where the grower has taken chemical control measures which are acceptable to the CSGA.

A forage crop offered for inspection must be isolated from possible sources of contaminating pollen. With the exception of blue grasses and slender wheat grass, most grasses are crosspollinated and in order to qualify as Certified seed require isolation of 150 yards for fields of less than five acres and 50 yards for fields exceeding five acres.

Where minimum isolation distances are not practical for fields exceeding five acres, border removal is permitted in grass crops provided arrangements can

be made for a second inspection. The border may range from zero to five yards depending on the distance of the contaminating pollen source.

With certain exceptions a pedigree seed grower is not permitted to produce more than one variety of the same kind of crop. Certification may be declined if more than one plant per 100 square yards of another variety is present in the field. A seed crop may be declined certification if it contains more than one per cent weed seeds of a kind that are difficult to separate. The presence of couchgrass seed or other prohibited noxious weeds may be a cause for declining certification.

Growing pedigree seed requires special skills. Canadian farmers are demonstrating that they can master the skills necessary to produce a quality product in a highly competitive field. But they will have to have the right variety, of pedigree status, to hold traditional outlets for seed. ■



*Champ timothy, the forage with aftermath quality, in rows three feet apart.*

# VALUING HOGS

The Canada Department of Agriculture implemented a new system of valuing hog carcasses on December 30, 1968. The former grades A-B-C have been replaced by an index based on the concept of appraising carcass merit as predicted by backfat and weight.

The immediate result will be greater reward to the producer who markets hogs that yield a relatively high proportion of lean meat.

The longer term result should be an increase in production of higher quality pork.

The new hog valuation policy is the outcome of several years effort by producers working in co-operation with the processing industry and with government. It has the enthusiastic backing of all three groups.

## HOW THE NEW SYSTEM WORKS

The Canada Department of Agriculture will measure and appraise carcasses on the rail and supervise weighing as at present. Payment will continue to be based on warm carcass weight.

The main difference in the new rating system is that total backfat and weight will determine the index and thus the value of the carcass.

Total backfat will be the sum of *maximum depth of shoulder fat plus maximum depth of loin fat*. All measurements will be taken to the nearest *tenth of an inch*.

Hogs, whose warm dressed weight is between 125 and 180 lbs., will be placed in one of 13 index categories. Other value-yield categories have been established for light carcasses (90 to 124 lb); heavy carcasses (181 to 195 lb.); extra heavy carcasses (196 lb. and over); and for ridglings.

The Table of Differentials is the key to the new valuation system. The index figures in the table are the result of exhaustive tests conducted on hog carcasses over the past three years.

The first column shows the total of two backfat measurements.

The second column shows the percentage of predicted yield associated with each backfat category. This should be useful to breeders wanting to improve their breeding program.

Across the top of the table are the ranges of warm carcass weight.



# ÉVALUATION DES PORCS



*Close-up of backfat measurements.*

*Mesure de l'épaisseur du lard dorsal.*

Le 30 décembre dernier le ministère de l'Agriculture du Canada a appliqué sa nouvelle méthode d'appréciation des porcs abattus. Les catégories A, B et C ont fait place à une formule de détermination de la qualité au moyen d'indices basés sur le poids et le lard dorsal des porcs abattus.

Dans l'immédiat, le producteur de porcs d'un bon rendement en chair maigre augmentera ses recettes; à longue échéance, on prévoit une production accrue de porcs de qualité supérieure.

La nouvelle formule d'évaluation est le fruit de plusieurs années de travaux menés par les producteurs en collaboration avec les industriels et le gouvernement; elle a l'appui des trois groupes.

## FONCTIONNEMENT DU SYSTÈME

Le ministère de l'Agriculture du Canada continuera de mesurer et d'apprécier la valeur des carcasses à la pente et d'en surveiller la pesée. Le paiement continuera de se faire d'après le poids de la carcasse chaude.

La principale différence du nouveau système vient de ce que le total des deux mesures du lard dorsal, plus le poids de la carcasse, détermineront l'indice et, conséquemment, la valeur du porc abattu.

Le total du lard dorsal équivaldra à *l'épaisseur maximale du gras au niveau de l'épaule plus l'épaisseur maximale du gras au niveau de la longe. Toutes les mensurations seront notées au dixième de pouce près.*

Les porcs dont le poids chaud à l'abattage se situe entre 125 et 180 livres se rangeront dans treize indices-catégories. Il y aura d'autres catégories de valeurs-rendements pour les carcasses légères (90 à 124 livres), les carcasses lourdes (191 à 195 livres), les carcasses extra-lourdes (196 ou davantage), et pour les semi-castrats.

Le Tableau des indices différentiels est la clé du nouveau mode d'évaluation. Les indices qui y figurent sont le résultat d'essais complets pratiqués sur les porcs abattus depuis trois ans.

La première colonne comprend le total des deux mensurations du lard dorsal.

La deuxième colonne indique le pourcentage du rendement prévu selon chaque catégorie de lard dorsal. Ces données seront utiles aux éleveurs désireux d'améliorer leur programme d'élevage. Au haut

TABLE OF DIFFERENTIALS

TABLEAU DES INDICES DIFFÉRENTIELS

Backfat in. Lard dorsal po.	Predicted yield Rendement prévu	POUNDS/LIVRES									
		90	125	130	140	150	160	170	181	196	Ridgling and over et plus
		124	129	139	149	159	169	180	195		Semi- castrats
— 1.9	69.7%	87	105	109	110	112	112	112	91	85	67
2.0 - 2.1	69.0%	87	103	107	109	110	112	112	91	85	67
2.2 - 2.3	68.2%	87	102	105	107	109	110	110	91	85	67
2.4 - 2.5	67.5%	87	100	103	105	107	109	109	91	85	67
2.6 - 2.7	66.7%	87	98	102	103	105	107	107	91	85	67
2.8 - 2.9	66.0%	87	97	100	102	103	105	105	91	85	67
3.0 - 3.1	65.2%	87	95	98	100	102	103	103	91	85	67
3.2 - 3.3	64.5%	87	92	97	98	100	102	102	91	85	67
3.4 - 3.5	63.8%	87	88	95	97	98	100	100	91	85	67
3.6 - 3.7	63.0%	87	88	92	95	97	98	98	91	85	67
3.8 - 3.9	62.3%	87	88	88	92	95	97	97	91	85	67
4.0 - 4.1	61.5%	87	88	88	88	92	95	95	87	82	67
4.2 - 4.3	60.8%	87	88	88	88	88	92	92	87	82	67
4.4 - +	60.1%	87	88	88	88	88	88	88	87	82	67

At present Canadian hog carcasses average 154 lb. warm carcass weight (excluding sows and stags). Based on tests carried out in developing the new grading system, the average total backfat of A and B grade carcasses is 3.2 in. Reading across from the backfat measurement and down from the carcass weight we see that the index for a 154-lb. carcass with total backfat of 3.2 to 3.3 in. is 100 and might be termed an "average" hog.

As total backfat decreases, the differential index increases and conversely as backfat increases, the index decreases.

Each of the figures within the table is an index or a percentage change of the value per pound of carcass, which ranges up and down from 100.

Market bids for hogs will be made on a warm dressed weight basis and the *bid price will apply to those carcasses with an index of 100*. A carcass with an index of 110 will be worth 10 per cent more per lb. than the bid price, and one scoring an index of 90 will be worth 10 per cent less per lb. Thus, the bid price per lb is adjusted accordingly in the Table of Differentials.

Type demerits due to deficiency in the belly or to roughness will result in a decrease of three points in the index. Quality demerits due to abnormal fat and abnormal color and/or texture of lean will result in a decrease of 10 points in the index.

Where a Health of Animals Inspector requires removal of certain parts of the carcass before allowing it to be processed, the weight of the parts removed will be subtracted from the weight of the

du tableau figurent les écarts de poids chaud des carcasses.

A l'heure actuelle, les porcs abattus au Canada pèsent en moyenne environ 154 livres, poids chaud (sauf les truies et les verrats). D'après les études liées à la formation du nouveau mode de classement, l'épaisseur moyenne de lard dorsal chez les porcs des catégories A et B est de 3.2 pouces. En se référant aux données horizontales des mensurations du lard dorsal et aux données verticales du poids de la carcasse, on constate que le porc abattu de 154 livres ayant 3.2-3.3 pouces de lard dorsal (porc qualifié de *moyen*) a 100 pour indice.

A mesure que diminue le lard dorsal, l'indice différentiel s'accroît; au contraire, à mesure que le lard dorsal augmente, l'indice décroît.

Chaque chiffre du tableau constitue un indice ou une différence procentuelle de la valeur par livre de carcasse au-dessus et au-dessous de 100.

Les offres d'achat seront basées sur le poids de 100 livres, chaud, à l'abattage. Une carcasse d'un indice de 110 vaudra 10% de plus la livre que le prix offert; une carcasse dont l'indice sera 90 vaudra 10% de moins la livre. Ainsi, le prix offert les 100 livres sera corrigé pour tenir compte des données du Tableau des indices.

Les défauts quant au type concernant la poitrine et le ventre ainsi que la grossièreté entraîneront une perte de trois points à l'indice. Les défauts de qualité comme la présence de gras anormal et de maigre offrant une couleur ou/et une texture anormales entraîneront une perte de dix points à l'indice.

carcass. The adjusted weight will be the weight for settlement but the original unadjusted weight will be used to determine the appropriate index.

## SETTLEMENT

With information on backfat and weight, the buyer will refer to Table of Differentials and:

- (i) Select the appropriate index from the table.
- (ii) Multiply the 'bid' price by the index to get the value per pound for that carcass.
- (iii) Multiply that price by the actual warm dressed weight (providing there are no trimable demerits) and thus arrive at the price to be paid for that carcass.

For example, if the bid price is \$30.00 per cwt., the computation for a 150 lb. carcass with a 2.5 in. backfat would be:

- (a) Index—107
- (b)  $30 \times 107 = 32.1¢$
- (c)  $32.1 \times 150 = \$48.15$

The new system will not increase the total amount paid for the total supply of hogs, although as the quality of hogs improves through use of the system the producer will gain by producing better hogs more economically. In addition, consumer acceptance of pork should improve.

It will provide a greater spread in value between the top and bottom quality category than under the old system. And the spread will widen as the price of hogs rises.

The addition of a federal quality premium will further spread the advantage in favor of quality production and result in a substantial incentive for the production of high quality carcasses.

The Canadian Swine Council and the Meat Packers of Canada will continue to assess the results of the new system to ensure that the value-yield indices are as accurate as possible and to ensure that Canadian hogs continue to produce the kind and quality of cuts demanded by the market. The system can be readily amended as new information becomes available. ■

Les défauts qui obligeront l'inspecteur vétérinaire à ordonner le parage à l'abattoir comme condition au dépeçage de la carcasse entraîneront une réduction de poids égale aux parures (rognures). Le poids ainsi rectifié servira à établir le montant du paiement des carcasses défectueuses, mais le poids original, non rectifié, déterminera l'indice attribuable à ces porcs.

## RÈGLEMENT

Une fois connus les renseignements sur le lard dorsal et le poids, l'acheteur se référera au Tableau et:

- i) choisira l'indice approprié;
- ii) multipliera le prix offert par l'indice pour établir la valeur par livre de carcasse;
- iii) multipliera ce prix par le poids chaud réel à l'abattage (en l'absence de causes de réfaction) pour établir le prix à payer pour la carcasse.

Exemple: si le prix offert est \$30 les 100 livres, le prix d'un porc abattu de 150 livres dont le lard dorsal mesure 2.5 sera:

- a) indice 107
- b)  $30¢ \times 107 = 32.1¢$
- c)  $32.1¢ \times 150 = \$48.15$ .

Le nouveau mode n'augmentera pas la somme payée pour l'ensemble des porcs offerts mais, avec l'amélioration graduelle de la qualité des porcs, le producteur y gagnera par une production plus économique de meilleurs sujets. Au surplus, le consommateur sera mieux servi.

Le nouveau mode élargira l'écart de valeur entre la première catégorie qualitative et la dernière, écart qui ira croissant avec la hausse des prix.

L'attribution d'une prime aux porcs d'un indice supérieur accentuera cet écart et encouragera la production des porcs de qualité.

Le Conseil canadien du porc et le Conseil des salaisons du Canada continueront d'apprécier les résultats du nouveau système. Au surplus, il sera facile de modifier la formule, s'il y a lieu. ■

*Based on experience during first months of application, there have been amazingly few difficulties encountered in the application of the new system of valuing hog carcasses. According to comments from the Canadian Swine Council and individual swine producers, the system is meeting with enthusiastic favor. Although the new system has been in effect since December 30, 1968, it is still premature to draw any definite conclusions regarding the impact or effect of the change in terms of improvement in hog quality.—R. K. Bennett, Director, CDA Livestock Division, Ottawa, Ont.*

*Le nouveau système d'évaluation des carcasses de porcs n'a donné lieu qu'à très peu de difficultés, si l'on en juge par l'expérience des premiers mois de son application. D'après les commentaires formulés par le Conseil canadien du porc et par les éleveurs de porcs, le nouveau régime est reçu avec enthousiasme; mais bien qu'il soit mis en application depuis le 30 décembre 1968, il est encore prématuré de tirer des conclusions définitives sur l'effet que peut avoir le changement quant à l'amélioration de la qualité du porc.—R. K. Bennett, Directeur, Division des bestiaux, Ministère de l'Agriculture du Canada, Ottawa, Ontario.*

H. TEMMERMAN, W. A. CUMMING  
and M. REIMER

Par la double-greffe, il est possible d'éviter les dommages de l'hiver aux arbres fruitiers. La pratique est préconisée pour les vergers des Prairies.

Recovery of fruit trees from winter damage caused by the severely cold and dry Prairie winters has been a continuing problem. Stembuilding—the scientific approach to rebuilding a fruit tree—has become a recommended practice among apple growers in the Prairies. When branches suffer winter damage then recovery may be fairly rapid during the summer, but when the crotches or trunks of fruit trees are injured, many trees have been ruined.

Apple varieties of good eating quality frequently lack tree hardiness and good crotches. Our investigations into the stembuilding potential of fruit trees at the CDA Research Station in Morden has shown that stembuilders must be strong enough to carry a heavy load of fruit, to withstand high winds and to bear the weight of snow in winter. An ideal stembuilder variety should have a smooth, straight stem with well placed, wide angled branches.

Our research started in 1955 with forty hardy apple selections which were considered to have some potential as stembuilders. Sixteen were hardy

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The authors are at the CDA Research Station, Morden, Man.

crabapples which had been under test for many years. The others were from crabapple by apple crosses. These were hardy and had shown strong crotch structures because of parental background. Goodland (an open pollinated seedling of Patten Greening) and Morden 359 (Wealthy × Melba), two scion varieties, were top-worked to the stembuilders. Both are large-fruited apple varieties that mature in mid-September. Morden 359 is borderline for hardiness and Goodland is hardy at Morden.

Four, one-year-old budded trees of each stembuilder on Columbia rootstock, were planted in the spring of 1955. Trees were grown under clean cultivation, in a sheltered area, with no mulch or ground cover. After one year's growth, two trees of each stembuilder were cut back to two inches above the union. The strongest shoot was permitted to develop into the new stem and all shoots removed. It was necessary to stake and tie the new shoot to prevent breakage by wind and during field cultivation.

Except for normal orchard procedures, the trees received little attention until the spring of 1958 when measurements were made of tree height and trunk diameter (6 in. above the soil line). Then the branches most suitable for main scaffolds were marked for summer budding and the remaining branches were removed. The buds of Goodland and Morden 359 were placed 5 to 7 in. from the main trunk on selected scaffold branches. Where possible the branches for the first scaffold were selected on the southwest side of the tree, 8 to 12 in. from the ground; a recommended procedure to reduce the danger of late winter sunscald injury. Succeeding scaffold branches were chosen to provide a well spaced branch arrangement around the tree.

## **HARDY STEMBUILDERS FOR PRAIRIE ORCHARDS**

*A well branched, hardy stembuilder that has been top-worked (grafted) with the variety Goodland. The stembuilder variety, is Malus baccata var. 'Neritchinsk'.*



The trees were top worked each year from 1958 to 1962 when 5 to 8 scaffolds were obtained per tree. Adventitious (sporadic) shoots which developed were removed. Tree height and trunk diameter were measured in 1959, 1961 and 1963 and in the third year the angles between the scaffold branches and the main trunk were also measured. Trees developed from strongest shoots following the cutting-back treatment were of generally superior tree form than those that were not cut back. Trunks were straight and smooth regardless of variety. Branches were more uniform in size and better spaced around the trunk, making the selection of scaffold branches and pruning easier. Trunks and branches of trees that were cut back were remarkably free of spur or twig growth, as shown in the photos.

An analysis of the number of branches per tree showed no significant difference between cut back and uncut treatments, with the exception of the scion varieties which differed significantly. Trunk diameters were affected significantly by the treatment and also by the effect on the varieties. An analysis of the crotch angles of the stembuilders showed that the greatest variation was due to varietal differences. The effect of the scion varieties Goodland and Morden 359 on the stembuilders was not significant. The graft unions showed that the stembuilders and the scion varieties were all compatible.

Based on these studies at Morden, the three most promising stembuilders were:

*Anaros* (Antonovka seedling)—Vigorous, smooth stem, wide-angled branches, strong crotches, good placement of branches, pruning wounds healed over well. Limb breakage has not occurred at Morden as individual trees bore as much as 300 lb. of fruit. Average yield per tree over a 3 year period was 181 lb.

*Hybrid CC-14-45* (Charles Ross × Duchess)—This stembuilder selection was developed at Morden. Vigorous, wide-angled branches, strong crotches, good placement of scaffold branches. Average yield per tree over a 3 year period was 156 lb.

*Malus baccata* 'Nertchinsk' — This is a dwarf selection of Siberian crabapple. Scaffold branches are wide-angled and very strongly anchored. Twelve-year-old trees of this selection were 11.1 ft. high in 1966 compared to a mean height of 14.9 ft. for the remaining selections and 18.0 ft. high for the tallest selection.

Varieties such as Breakey, Goodland, Collet and Carroll may be used for topworking on stembuilders in southern Manitoba. Two or more varieties may be topworked on the same tree. The use of non-hardy varieties is risky and should be discouraged. Stembuilders will not compensate for poor growing conditions, neither will they ensure success where growing conditions are not satisfactory for apple trees. ■



Shows the effect of cutting back the stembuilder after it was propagated on Columbia rootstock:

A. The uncut stembuilder.

B. Stembuilder that was cut back.

# Proper Use of Pesticides Program



E. R. HOUGHTON

PUPP is a continuing activity of the Information Division with assistance from the Plant Products Division of the Canada Department of Agriculture. This activity received departmental approval in the fall of 1967 and its aim is to publicize by means of



posters, cartoons and other visual media the safe practices with respect to the use of pesticides in Canada. The program consists of a series of cartoons produced in the form of posters, envelope stuffers and newspaper insertions as well as film shorts for television.

The posters, envelope stuffers and other items are, on request, given free of charge to any interested agency in any useful quantity provided that agency agrees to distribute them. The situations caricatured in the cartoons are often limited to specific kinds of users of pesticides, e.g. poultry men, but sometimes

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# Programme de Bon Usage des Pesticides

E. R. HOUGHTON

Le PBUP est une œuvre permanente de la Division de l'information du ministère de l'Agriculture du Canada, entreprise avec l'aide de la Division des produits végétaux. C'est en automne 1967 que la sanction ministérielle a été accordée à l'initiative, dont le but est d'encourager, au moyen d'affiches et autres messages visuels l'emploi sûr et sans danger des pesticides au Canada. Le programme consiste en une série de caricatures présentées sous forme d'af-



fiches, feuilles publicitaires, encarts ou de courts métrages télévisés.

Ces moyens d'information sont offerts gratuitement, en quantités appropriées, à tout organisme intéressé à condition qu'il en assure la distribution. Les caricatures s'adressent souvent à certaines catégories précises d'utilisateurs de pesticides, par exemple les aviculteurs, mais elles ont parfois une portée

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they are of a general nature. In any event, the distribution is the main problem and involves both federal and provincial offices as well as private industry and requires the enthusiastic support of all concerned.

The program was initiated because it was felt that the instructions appearing on the labels of pest control products should be highlighted and reinforced using other media, but the emphasis should be light and humorous. Properly conducted studies have shown that the chief means of communication of information to users of pesticides is the label on the product containers. Pesticide labels are very carefully prepared by the manufacturer and checked by the Plant Products Division of Canada Department of Agriculture and if the instructions found thereon are followed the product is considered to be both safe and effective. While this may be true, many become careless and need to be continually reminded in a graphic manner that certain practices should be followed.

Verbal reports on the acceptance of the materials produced by the Information Division during 1968 has been good, and more cartoons are being prepared for 1969. For those readers of this publication, the Proper Use of Pesticides Program should have special significance and their suggestions and as-



sistance are solicited to increase the effectiveness of the program. Communication in this regard should be directed to the Information Division of the Canada Department of Agriculture, Sir John Carling Bldg., Ottawa, and clearly addressed to the Proper Use of Pesticides Program. ■

générale. Quoiqu'il en soit, leur distribution constitue la tâche principale, à laquelle contribuent les bureaux fédéraux et provinciaux ainsi que l'industrie privée et qui exige l'appui enthousiaste de tous les intéressés.

Ce programme a été instauré lorsqu'on a réalisé que les modes d'emploi indiqués sur les étiquettes des pesticides devraient être mis en relief et appuyés par d'autres moyens d'information, de préférence sous forme légère et humoristique. Des études bien dirigées indiquent que le principal moyen de transmettre l'information aux usagers de pesticides est



l'étiquette du récipient. Ces étiquettes sont préparées avec grand soin par le fabricant puis vérifiées par la Division des produits végétaux, de sorte qu'employé conformément au mode d'emploi, le produit devrait être à la fois efficace et sans danger. Il reste que beaucoup d'usagers sont imprudents et il est nécessaire de leur rappeler constamment, par l'image, qu'ils doivent prendre certaines précautions.

D'après les rapports qui nous sont parvenus, les dessins produits par la Division de l'information en 1968 ont été bien accueillis et l'on en prépare d'autres pour 1969. Les lecteurs de cette publication devraient accorder beaucoup d'attention au programme de bon usage des pesticides et nous faisons appel à leurs suggestions et leur aide pour accroître la portée de ce programme. Toute communication à ce sujet devrait être adressée à la Division de l'information du ministère de l'Agriculture du Canada, immeuble Sir John Carling, Ottawa, en mentionnant sur l'enveloppe: Programme du bon usage des pesticides. ■

# ECHOES

## FROM THE FIELD AND LAB



Eggs have long been recognized as a highly nutritious food. Now federal scientists are examining the possibility of breeding even more food value into the egg. (See below)

Depuis longtemps, l'homme s'est rendu compte des grandes qualités nutritives de l'œuf. Maintenant, les chercheurs du gouvernement fédéral ont recours à la génétique pour tenter d'améliorer davantage la valeur alimentaire des œufs. (voir au-dessous).

**INCREASING EGG PROFITS** The ingredients in eggs that no other human food contains could affect the future of the poultry egg industry. The reason is that modern technology is moving swiftly toward production of synthetic foods.

At the CDA Research Station, Agassiz, B.C., a study of the nutrients in eggs has been started. It includes measurement of the quantities of albumen and yolk solids under varying feeding practices for pullets and hens, as well as heredity.

Production is measured in terms of the number of eggs laid, but this will soon have to be done in terms of the amino acids and other ingredients in the eggs, since these are the factors that give them their food value.

One study measures the percentage of solids in the yolk and albumen of eggs. Because the solids in yolks are more valuable, it would be preferable to increase the yolk size relative to the total egg size.

In the genetic studies, five key factors are considered: number of eggs laid; their weight; hatchability; fertility and liveability.

During experiments in selecting pullets for their net egg returns, however, it was found that the percentage of albumen solids was almost as important as the number of eggs a hen lays. It was also found that this trait was highly correlated to production. In other words, it can be predicted with some accuracy whether a hen will be a good lifetime producer by analyzing the percentage solids in the albumen of the first eggs she lays.—A. T. HILL, AGASSIZ, B.C.

### PROFITS ACCRUS SUR LES OEUFS

Les composants de l'œuf, qu'aucun autre

aliment de l'homme ne contient, pourraient influencer l'avenir de l'industrie des œufs. La raison en est que la technologie moderne avance à grands pas vers la production d'aliments synthétiques.

La Station de recherches du ministère de l'Agriculture du Canada à Agassiz (C.-B.), vient de lancer une étude sur les éléments nutritifs des œufs. Elle comprend la détermination des quantités des extraits de l'albumen et du jaune des œufs de poulettes et de poules alimentées de différentes façons, et tient compte de l'hérédité.

Le chiffre de production est évalué d'après le nombre d'œufs pondus, mais bientôt il faudra mesurer les acides aminés et autres éléments des œufs, puisque ces facteurs leur donnent leur valeur alimentaire.

Une série d'études consiste à mesurer les proportions des extraits du jaune et de l'albumen des œufs. Du fait que les extraits du jaune ont plus de valeur, il serait avantageux d'accroître le volume du jaune par rapport au volume global de l'œuf.

Les études génétiques portent sur cinq facteurs principaux: le nombre d'œufs pondus, leurs poids, l'éclosabilité, la fertilité et la longévité.

Au cours des essais de sélection des poulettes pour leur rendement net en œufs, il a été constaté que la proportion d'extraits d'albumen était presque aussi importante que le nombre d'œufs pondus et que ce facteur est étroitement lié à la production. En d'autres termes, il est possible de prévoir avec assez d'exactitude si une poule sera bonne pondeuse sa vie durant, en déterminant la proportion d'extraits d'albumen des premiers œufs qu'elle pond.—A. T. HILL, AGASSIZ (C.-B.)

**NEW "GOLDEN" APPLES** Two new apples of the Golden Delicious type have been developed at the CDA Research Station, Summerland, B.C.

The new apples, presently unnamed, are similar in appearance to Golden Delicious but earlier in maturity. One, identified as 8C-4-5, matures 3 to 4 weeks before Golden Delicious. The other, 5G-9-49, is 1 to 2 weeks earlier.

For consumers it will mean availability of fresh apples of the Golden Delicious type over a longer period. Growers will also benefit, especially those in areas where, due to a short growing season, Golden Delicious does not develop to its full quality.

Developed from crosses of Golden Delicious and other yellow fruited varieties, the new apples are suitable for local roadside market sales but have a relatively short storage life. Like Golden Delicious, they have tender skin and flesh and require great skill in picking and sorting.

In limited marketing trials, 8C-4-5 did very well in competition with other apples of similar maturity.—K. O. LAPINS, SUMMERLAND, B.C.

### NOUVELLES POMMES DORÉES

Deux nouvelles pommes du genre de la Délicieuse dorée ont été créées dans les vergers de la Station fédérale de recherches de Summerland.

Ces nouvelles pommes, qui ne portent pas encore de nom, ressemblent à la Délicieuse dorée, mais mûrissent plus tôt. L'une, identifiée comme étant la 8C-4-5, mûrit de trois à quatre semaines plus tôt que la Délicieuse dorée, tandis que la deuxième, la 5G-9-49, mûrit d'une à deux semaines plus tôt.

Ces nouveaux fruits prolongeront la période au cours de laquelle les consommateurs pourront obtenir des pommes fraîches du type de la Délicieuse dorée. Les producteurs en profiteront aussi, particulièrement ceux des régions où la Délicieuse dorée ne peut donner toute sa valeur à cause d'une saison de croissance trop courte.

Obtenue par des croisements de Délicieuse dorée avec d'autres variétés à fruits jaunes, les nouvelles pommes conviennent pour les marchés du bord des routes, mais la durée de leur conservation en entrepôt est plutôt brève. Comme la Délicieuse dorée, elles ont une peau et une chair tendres, si bien qu'il faut en faire la cueillette et le triage avec beaucoup de précautions.

Au cours d'essais de commercialisation, la 8C-4-5 a très bien soutenu la concur-

# ECHOS

## DES LABOS ET D'AILLEURS

rence des autres pommes à maturité semblable.—K. O. LAPINS, SUMMERLAND, C.-B.

**PITIC 62** For the first time in Canadian history a licence has been granted by the Canada Department of Agriculture to a variety of non-milling wheat.

The variety is Pitic 62, and it was developed in Mexico in the joint breeding program carried on by the Mexican Ministry of Agriculture and Animal Industries and the Rockefeller Foundation.

It is a soft type wheat with a non-vitreous texture and is distinctly inferior in milling and baking quality to Canadian standard wheat varieties. Because of this, The Board of Grain Commissioners advises that it would be eligible only for grading into the feed grades of wheat.

It has a large semi-red colored kernel with a distinctive shape. It can, therefore, be readily distinguished from varieties of milling wheat now grown in Canada. For this reason, there should be no danger of it interfering with the quality of our milling grades because grain that contained kernels of this variety would be readily recognized and could be graded accordingly.

The variety was tested in Canada as early as 1964, and has been tested extensively at many locations during the past two years. The tests have shown that, where moisture is not limited and other factors are favorable to its production, Pitic 62 will give a substantially higher yield of grain than our standard milling varieties.

### CHEMICAL USED IN APPLE STUDY

A chemical that can prevent apples from ripening may produce greater knowledge of the ripening process in the fruit. Studies of the ageing, or ripening of apple tissue are presently being carried out at the CDA Research Station, Summerland, B.C. We have found that application shortly after bloom in the spring of high concentrations of succinic acid, 2,2-dimethyl hydrazide, will prevent ripening of McIntosh apples harvested in the fall. These apples are somewhat smaller than usual but otherwise seem normal.

The chemical, a hormone plant growth regulator known commercially as Alar, already has shown its value as an aid to apple growers.

Ripening is actually the natural and rapid ageing of mature plant tissue. It is the result of a combination of biochemical and physiological changes within the fruit tissue.

Enzyme changes lead to increased sugar, to softening of the fruit, and to loss of green color. Volatile chemicals are produced which give ripe fruit their characteristic odor. Cell membranes begin to break down, leading to higher tissue respiration and juicer texture.

This much is known, but the basic question remains: What triggers the ripening process? We believe that experiments under way at this station may produce an answer.—N. E. LOONEY, SUMMERLAND, B.C.

### DIFFERENT OIL FROM RAPESEED VARIETY

Oro, a new rapeseed variety that produces a new kind of vegetable oil, has been developed at the Canada Department of Agriculture Research Station, Saskatoon, Sask. It was recently licensed by the CDA.

An Argentine-type variety, Oro produces a new type of oil known as Canbra. Because this oil is free of the fatty acids eicosenoic and erucic, it is preferred by certain domestic refiners.

While the two acids have a nutritional value, without them the oil can be used in a wider range of products. Oil from Oro rapeseed is superior to normal rapeseed and soybean oils for the manufacture of certain kinds of salad and cooking oils, and is just as good as the others for making margarine and shortening.

Oro has performed well in cooperative tests throughout Western Canada and in a large-scale seed multiplication program carried out last year by the Saskatchewan Wheat Pool. It is equal to or better than the variety Tanka in seed yield and is one to two days earlier in maturing. Like other Argentine-type varieties, it should be seeded as early as wheat to ensure a harvest of mature, high-quality seed.—R. K. DOWNEY, SASKATOON, SASK.

### COMBINE POWER REQUIREMENTS

The amount of power required for traction and threshing govern the horsepower requirements of a self-propelled combine. In most cases these requirements take up about 65 to 75% of the available engine horsepower output, leaving a reserve to cope with unexpected power demands.

Topography and footing determine the power requirements for traction. But determining the requirements for threshing and separating the grain from the straw is much more complex since the power needs can

differ with the variety of grain being harvested, the type of threshing cylinder used and the quantity of material being handled per unit of time.

Studies at the CDA Research Station, Swift Current, Sask., have shown that 20% more power is required to thresh the solid-stemmed Chinook wheat than the hollow-stemmed Canthatch. Chinook, therefore, must be harvested at a slower rate than Canthatch.—M. E. DODDS, SWIFT CURRENT, SASK.

**HERCULES LICENSED** A new durum wheat variety, Hercules, was recently licensed by the Canada Department of Agriculture. It was developed at the CDA Research Station, Winnipeg, Man., through a complex crossing program, the final cross being made in 1957.

Hercules is about one week earlier maturing, and 9 inches shorter than Stewart 63.

These are important characteristics in the black soil zone of Manitoba and eastern Saskatchewan. In this area, Hercules has yielded about equal to Stewart 63. In the brown soil zone of Saskatchewan and Alberta, yields have averaged somewhat lower, particularly where early-season drought has occurred.

Hercules has good leaf and stem rust resistance, and is the first commercial durum wheat variety in Canada with resistance to loose smut. Also, it has good seed size, strong gluten and excellent color for pasta products. The combination of these latter three characteristics will give Canadian durum wheat a competitive advantage in the export market.

**REGIONAL VARIETY TRIALS** A total of 44 new cereal and oil seed varieties were approved for use in Manitoba in the past 25 years after being tested for adaptability to conditions in the province, at the CDA Research Station, Brandon, Man.

Another 112 varieties and strains of cereal and oil seed crops did not make the grade in the regional variety trials carried out between 1942 and 1967 and were not recommended for use in the province.

Bread and durum wheats accounted for 11 of the 44 varieties that performed well enough to rate recommendation. Of the remainder, 12 were malting and feed barleys, 9 were oats, 10 were flax, and 2 were fall rye.—B. J. GORBY, BRANDON, MAN.

LIONEL LACHANCE et  
TAFT CAMERON

This article deals with the influence of the harvesting date on the productivity of two hybrid fodder corns. The semi-early hybrid Pride 5 and the late Warwick 600 have been used in tests conducted at Lennoxville, since 1966. This study is valid for those agricultural regions whose heat-degrees limits vary between 1700 and 2500 thermal units.

Les essais comparatifs de rendement, effectués à la Station de Recherches de Lennoxville, depuis de nombreuses années, sur les maïs hybrides fourragers de précocité différente, ont permis de déterminer ceux qui convenaient le mieux aux Cantons de l'Est. Cette région dispose en moyenne de 2,200 degrés de chaleur ou unités thermiques (u.t.) entre le 15 mai et le 15 septembre; elle se situe dans une vaste zone agricole dont les limites varient de 1,700 à 2,500 u.t. selon que l'on est près de Québec ou de Montréal. La majorité des maïs hybrides du commerce exigent 2,500 unités et plus pour atteindre leur maturité complète, il est donc impossible de mûrir le grain à Lennoxville; récolté en fin septembre, le maïs fourrager y atteint cependant le stade pâteux requis pour un bon ensilage.

Des essais ont été entrepris depuis 1966 pour mesurer la productivité de deux maïs de précocité différente, l'hybride mi-hâtif Pride 5 (2,600 u.t.) et tardif Warwick 600 (3,000 u.t.), récoltés au début et à la fin de septembre.

#### PRÉPARATIFS D'ESSAIS

Sur deux champs de 10 acres, bien drainés, on a appliqué 15 tonnes de fumier comme fumure de base. L'ensemencement a été effectué à la mi-mai sur des rangs espacés de 36 pouces à la dose de 12 livres de semence à l'acre. Au moment du semis on a déposé dans le sol, en bordure des grains, 500 livres de 10-10-10 à l'acre.

Messieurs Lachance, Chef de la division de Phytotechnie et Cameron, spécialiste de la nutrition à la division de zootechnie appartiennent à la Station de recherches de Lennoxville, Québec. Cet article a été écrit par Jean Baroux de la Division de l'information, en collaboration avec Messieurs Lachance et Cameron.



## RENDEMENT DU MAÏS FOURRAGER

Une livre et demie d'Atrazine 65W par acre a permis de contrôler les mauvaises herbes. Du nitrate d'ammoniaque, 250 livres à l'acre, a été épandu fin juin lorsque les plants atteignaient 8 pouces.

#### DEUX RÉCOLTES

Au cours de ces essais, les conditions météorologiques ont modifié le développement physiologique des maïs. Ainsi, en 1966, lors du premier prélèvement (6 septembre) les grains du Pride 5 et du Warwick 600 étaient au stade pâteux, tandis qu'à la même date en 1968, ils étaient laitueux. De plus, l'effet de gelée mortelle tant désiré au moment de la coupe tardive n'a pu être réalisé faute de gelée avant la récolte du 26 septembre.

Les dates de récoltes permettent donc de comparer l'influence du développement physiologique sur les rendements et sur la contribution des parties composantes de la plante au rendement.

##### 1) — Le 6 septembre

Le stade de développement atteint par le Pride 5 a varié de laitueux à pâteux, tandis que celui du

Mais fourrager qui a subi une gelée mortelle à la mi-septembre à Lennoxville. Toute croissance a cessé et la teneur en eau a diminué fortement. La valeur alimentaire n'est pas altérée.



TABLEAU 1 — INFLUENCE DE LA DATE DE RÉCOLTE SUR LA PRODUCTIVITÉ DE DEUX MAÏS FOURRAGERS, STATION DE RECHERCHES DE LENNOXVILLE, 1966-68.

	6 septembre		26 septembre	
	Pride 5	Warwick 600	Pride 5	Warwick 600
Stade à la récolte	lait-pâteux	aqueux-lait	pâteux-denté	laiteux-pâteux
Rendements (T/A) M.V.				
Plants entiers	23.9	26.5	26.3	31.4
Rendements (T/A) M.S.				
Tiges	2.38	2.79	2.10	2.84
Feuilles	0.65	0.79	0.76	1.12
Spathes	0.56	0.52	0.51	0.56
Épis	1.36	0.85	2.85	2.39
Plants entiers	4.95	4.95	6.22	6.91
Teneurs (%) en M.S.				
Tiges	18.0	16.7	19.4	17.3
Feuilles	22.5	21.4	26.4	23.6
Spathes	20.4	17.2	24.4	19.6
Épis	26.6	19.2	42.3	31.4
Plants entiers	20.8	18.1	25.6	21.8
Contribution (%) aux rendements secs				
Tiges	48.1	56.4	33.8	41.1
Feuilles	13.1	15.9	12.2	16.2
Spathes	11.3	10.5	8.2	8.1
Épis	27.5	17.2	45.8	34.6
Plants entiers	100.0	100.0	100.0	100.0

## SUIVANT LA DATE DE RÉCOLTE

Warwick 600, du stade aqueux à laiteux. Les rendements verts obtenus du Pride 5 ont été en moyenne de 23.9 tonnes à l'acre et ceux du Warwick 600, de 26.5 tonnes.

L'écart des rendements s'explique par la différence physiologique de ces deux hybrides. Pride 5 est plus précoce et conséquemment, il possédait moins d'eau dans ses tissus soit 79.1% en regard de 81.9%. Exprimés en matière sèche, les rendements des deux hybrides ont été semblables soit 4.95 tonnes à l'acre. Ce qui a varié toutefois, c'est la contribution des parties au rendement (Tableau 1). La différence physiologique s'est manifestée dans toutes les parties composantes et leur teneur en M.S. ont été plus faibles chez l'hybride tardif Warwick 600 que chez Pride 5.

### 2)—Le 26 septembre

En fin de septembre, le Pride 5 avait atteint le stade pâteux mais en '66, une forte proportion des épis portait des grains dentés. À la même date, le Warwick 600 était à mi-chemin entre les stades laiteux et pâteux. Cette différence de maturité se

réflétait dans les teneurs en matière sèche. Ainsi, Pride 5 atteignait 25.6% et Warwick 600, 21.8%. Les rendements verts, pour leur part, accordaient une supériorité au Warwick 600, soit 31.4 tonnes par rapport à 26.3 pour Pride 5. Les rendements secs ont été légèrement différents et Warwick 600 a fourni 6.91 tonnes contre 6.22 tonnes pour Pride 5. La contribution des tiges, des feuilles et des spathes de Warwick 600 a été légèrement supérieure à celle de Pride 5. Par contre les épis de Pride 5 ont produit 2.85 tonnes de M.S. en regard de 2.39 pour l'autre hybride.

La récolte effectuée en fin septembre 20 jours après la première, a permis d'augmenter les rendements secs des plants entiers de Pride 5 de 4.95 tonnes à 6.22 tonnes soit 25% et ceux de Warwick de 4.95 à 6.91 tonnes, soit 39%; ces augmentations de poids sont attribuables au développement physiologique des épis. Ainsi Pride 5 qui produisait 1.36 tonne d'épis au début de septembre en fournissait 2.85 tonnes à la fin, soit une augmentation de 109%. La même tendance s'est manifestée chez Warwick 600 dont le rendement sec est passé de

0.85 tonne à 2.39 tonnes soit une augmentation de 181%.

Un fort potentiel de rendement a été relevé chez les hybrides à maturité tardive comme le Warwick 600. Ces maïs à croissance plus lente mais à grand développement peuvent certainement être employés dans les régions disposant de moins de 2,000 u.t. car ils utilisent au maximum les ressources du milieu, dont la lumière solaire, et produisent de forts rendements constitués de tiges et de feuilles.

Il reste cependant, que dans les régions où la chaleur permet aux épis de former des grains, les maïs mi-hâtifs sont recommandés car, les grains contribuent à augmenter la valeur biologique du maïs fourrager. En région plus fraîche, comme la région de Québec et du Bas St-Laurent et celle qui borde la rive nord du fleuve, les maïs tardifs peuvent toutefois fournir de forts tonnages d'un aliment très saint pour les ruminants.

Une dernière proposition serait d'utiliser en même temps des maïs de maturités différentes de façon à combler le manque de rendements des maïs hâtifs riches en épis par des plantations de maïs tardifs qui viendraient fournir des quantités plus fortes sous forme de tiges et de feuilles.

*Dans notre prochain numéro nous publierons un article sur la suite de l'expérience effectuée à Lennoxville. Cette deuxième partie traitera de la valeur nutritive pour les jeunes bouvillons, de l'ensilage de maïs des variétés à maturités hâtive et tardive, récoltées aux deux dates, 6 et 26 septembre.*

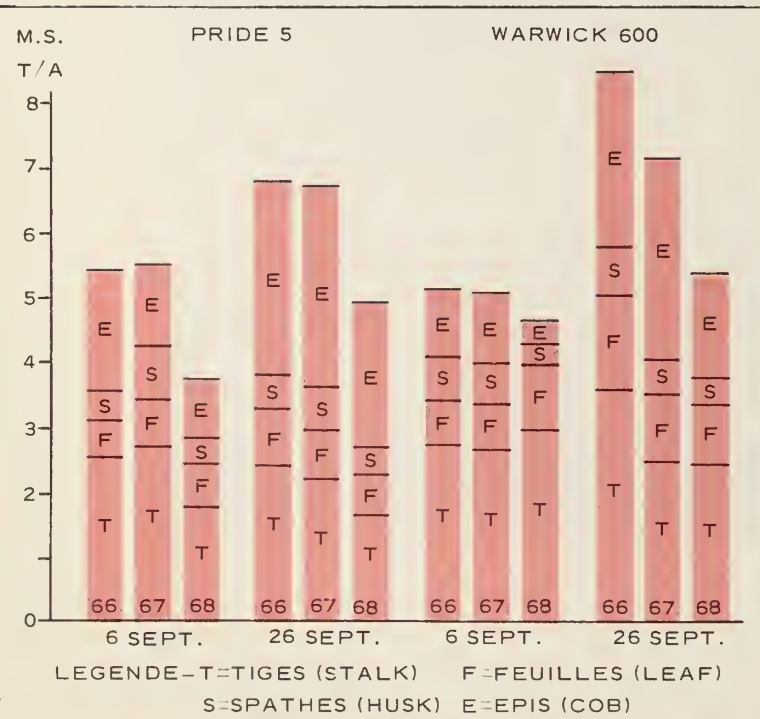


*Maïs Pride 5 au moment de la récolte hâtive. Il est en pleine croissance car la gelée n'a pas encore eu lieu.*

*Maïs récolté le 6 septembre 1966. Warwick 600 (à gauche) au stade aqueux, Pride 5 (à droite) au stade pâteux.*



*Maïs fourragers—contribution des parties aux rendements S.R.L. 1966-67-68.*



# clubroot-resistant CABBAGE for Quebec

M. S. CHIANG and R. CRÊTE

La hernie cause chaque année au Québec la perte de nombreux champs de crucifères. Il semble que le moyen de défense le plus prometteur soit la mise au point et la sélection de variétés de choux résistantes à la maladie.

Clubroot, caused by *Plasmodiophora brassicae* Wor., is one of the most destructive diseases of crucifer (cabbage line) crops in Quebec. Surveys have shown that losses are generally heavy each year. In some fields the disease has wiped out entire crops so that growers have had to abandon cabbage production in those fields.

There are many identified physiological races of this organism attacking crucifers. Race 6A is the predominant one in the Montreal area whereas race 2 is found more frequently in the Quebec City area.

Practical and effective means of controlling clubroot in mineral as well as in organic soils are few. Previous experiments have shown that no fungicide controls clubroot equally well in mineral and organic soils. Chemicals such as  $HgCl$  and  $HgCl_2$  will reduce the disease incidence to some extent in both types of soil. The soil fungicide quintozene may give satisfactory results in moderately infested mineral soil whereas it will not control clubroot in organic soil. Therefore, developing resistant varieties of cabbage through breeding would seem the most promising and effective means of control.

At the St. Jean Research Station, breeding work has progressed during the past three years. Preliminary screening tests of wide collections of cabbage and other crucifers, obtained from plant introduction stations of the U.S.D.A. and through personal correspondence with plant breeders of various countries, have been done in the greenhouse during the winter months.

A standard technique has been developed to

ensure adequate infection to avoid escapes in testing cabbage lines, strains and varieties. In our investigations, we retain the varieties or selections showing a low disease index (below 30 per cent) for field tests in heavily infested mineral and organic soils at the satellite farms of L'Acadie and Ste. Clotilde, respectively. At maturity, we examine each plant and index for clubroot. We select those free from disease and store in a cold room at 36 to 38°F. for a period of three months, to employ as breeding stocks.

Our research has revealed that three cabbage introductions from Germany and one from Holland have shown a high degree of resistance to the predominant race in our area. Unfortunately, all four



Resistant line 8-41 (left) and susceptible commercial Red Acre grown side by side in clubroot-infested field.

lines possess relatively poor horticultural characteristics, such as large flat heads, incompactness, traces of red-colored leaves, etc.

A considerable number of plants with a high degree of resistance and good qualities have already been selected from segregating populations resulting from crosses between resistant and susceptible varieties. However, further inbreeding and selection are necessary before a resistant commercial variety can be developed. The most promising line we have developed at St. Jean is designated at present as 8-41 and is in its fourth generation of inbreeding after hybridization. We selected this line from the hybrid in which one parent has inherited the resistance genes from kale. Line 8-41 was tested in the summer of 1968 in the field, along with the four commercial varieties, Golden Acre, Red Acre, Houston Evergreen and Pennstate. We found that all four varieties did not produce marketable heads because of severe clubroot infection whereas line 8-41 produced a good normal crop. The line has shown a high degree of resistance but is not immune. It also produces relatively small and firm heads which can stand in the field for several weeks after maturity without splitting. We believe that this line should be available to the Quebec growers in the near future.

Dr. Chiang is a plant geneticist and Mr. Crête is a plant pathologist at the CDA Research Station, St. Jean, P.Q.

L'orientation de l'aviculture vers une industrialisation plus poussée au cours des 25 dernières années, s'est accompagnée de graves répercussions économiques, par suite des violentes fluctuations de prix qui ont obligé ce secteur agricole à rechercher les moyens d'atteindre plus de stabilité. L'auteur parle du développement de l'aviculture durant cette période, insistant davantage sur les tendances actuelles vers la mise sur pied d'un programme de régulation des disponibilités à l'échelle nationale.

## MARKETING TRENDS APPLIED TO CANADA'S POULTRY INDUSTRY

Agricultural production and marketing is rapidly becoming industrialized. Many of the advances to date, particularly in the poultry industry, can be attributed to the growing involvement of large corporations in the production and marketing of farm products. This trend raises a very important question as to the future independence of the primary producer. The trend to inter-dependence in the poultry industry can also have a very definite bearing on the future role of the various groups involved in allied industries, such as the hatcheryman, the processor, the egg grading station operator and others. Some areas of food production, including poultry meat and egg production, are very susceptible to the inroads of industrialization. I do not think that this trend is necessarily wrong. In my opinion, the substantial progress made in this industry during the past decade can be attributed, in part, to the involvement of large commercial organizations and that without this trend we probably would not have the present efficient poultry industry.

At the same time, however, there possibly is reason for producer groups to be apprehensive about their place in this trend and to develop means that will assist them in maintaining their place in a

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Mr. Davey is Director, Poultry Division, CDA Production and Marketing Branch, Ottawa. This article is based on a paper he gave recently to the annual convention of the Ontario Hatcheries Association.

rapidly changing industry. This had led to the development of the 'marketing board era'.

If you have occasion to review poultry periodicals and reports from various countries, it is interesting to note how many of these reports deal with problems relating to industry stability or instability, and indications of what industry groups are or are not doing to try to help themselves. It is quite evident that most of the countries which are well advanced in the use of poultry 'know-how' are having no end of trouble in 'knowing-how' to handle their problems of over-production.

The action that is taken in each country is largely dependent on the attitude, guidance or recommendations of poultry industry leaders. In some countries, the people who speak most forcefully for industry consider it an infringement on personal rights to have to comply with a program which sets out controls of either production or marketing. When I speak of a program of controls, I am not referring to those based on 'gentleman's agreement' because these are effective only to the extent that it suits each individual. I am referring to a program with teeth. The popular reaction to such controls is that they violate basic democratic rights. The 'freedom to go broke'—and incidentally at the same time contribute to taking others under with them—is often referred to as one of the very essential freedoms. I doubt if there is much argument about being able to 'go broke' if you so choose, or as a result of your method of operation, but have you the right to break others?

On the other extreme, there are countries where programs exist that result in an almost continuous state of over-production because of attempts to keep producer prices artificially high without marketing controls. In such countries, they may have their periods of shorter supply of such commodities as eggs, but the resultant backlog of egg products from a period of surplus shell egg production is big enough to be a continual threat to themselves and to all the foreign markets to which they choose to direct their surplus. The prices of these surplus egg products invariably are much below the cost of production of the shell eggs used in manufacture.

Neither of these extremes, if the disastrous results were limited to the boundaries of their own country, should be of concern to the Canadian poultry industry. Unfortunately, the adverse effects have a habit of overflowing. The poultry industry in Canada is well aware of this because it has been on the receiving end from both extremes.

### DEVELOPMENTS IN EGG PRODUCTION

It is only over the past quarter of a century that the Canadian poultry industry has truly come of age. During the World War years of the forties, this industry emerged rapidly from 'the romantic

aspect of the farm-yard operation' to become an integral part of the Canadian agricultural economy. During the forties, controls on production were unnecessary because there was a real need, not only in Canada but in our contribution to Canada's war effort, for all food products that could be produced—from the poultry industry it was mainly eggs. In that period of industry development, poultry meat did not play the prominent role that it does today and the farm income from eggs was still greater than all poultry meat combined.

Suddenly, about 1950 the situation changed. Although the world population was about the same, the wartime drive that saw large quantities of food produced to feed the allied fighting men subsided, and a peacetime pace set in as post-war demands became established. Thus, with the poultry industry having begun its trend towards industrialization, surplus egg production became a problem and a program was needed to prevent the industry's collapse. This was possibly the first experience of the Canadian poultry industry through programs of the Canada Department of Agriculture, to try and fit the industry's production potential to the available market.

As the evolutionary trend towards greater industrialization of the poultry industry developed, it became necessary to utilize one program after another. Each program was structured to fit the demand at the time, in keeping with the socio-economic development of the country.

The poultry production and marketing programs developed for eggs under the CDA Agricultural Stabilization Board emphasized assistance for only the low end of the market. This was unfortunate

because the stability necessary to control the periods of shortages and high prices was lacking. As a result, the industry has continued to suffer from periodic 'boom-and-bust' cycles.

Although the turkey and broiler chicken industries have not been involved in such programs, they have periodically experienced the same pains of over-production.

## MARKETING LEGISLATION

After many years of the severe consequences of 'boom-and-bust' cycles, producer groups have turned to existing provincial legislation under which they can organize marketing boards to develop compulsory programs to regulate the volume of product and, in some instances, the prices paid. By this means, they have attempted to shape their own economic success. Although this legislation is not new, it seems that the industry must develop a certain frame of mind or attitude towards such controls before any interest becomes evident. Such interest develops very slowly and only after repeated economic reversals.

Some six years ago the first poultry marketing board came into being—The B.C. Broiler Marketing Board. It has been followed by various boards for turkeys, shell eggs, and broilers in many of the provinces, and others are in the process of developing such programs. However, in some sections of the industry, there is still strong resistance against the move toward the absolute control program of marketing boards. Many feel strongly that there should not be any controls on this trend toward greater industrialization of the various segments of the poultry industry.

Many thousands of words have been written and spoken for and against these developments. There are good and sound arguments on both sides of the issue. The division in opinion appears to be caused more by disagreement on the means of achieving stability rather than on the need of greater stability in the industry. Furthermore, much of the anti-board concern seems to originate in fear of the immediate effect of the types of controls advocated by provincial boards and proposed for a national commission. There is also fear of the long-term effect on the industry by the ramifications of such controls, both domestically and internationally.

Many watching this development, who are involved in related segments of the industry, hope this trend can be advanced in such a manner that their future can be programmed by a well organized team effort.

The legislation of the various provinces, which provides authority for the operation of respective marketing boards, specifies that the basic authority for the operation of each board program is in the hands of the primary producer. At the same time,



*Feeding time in a modern egg producing plant.*

the hatchery operator, the poultry processor, and the egg grading station operator perform a useful and possibly indispensable function, and fill a complementary role.

In accordance with present legislation, it is essential that one segment of the industry assume responsibility for regulating the program and setting down basic ground rules to control itself. It is evident that this can be most readily achieved by producer groups. Some might argue that in today's dynamic integrated industry the definition of a producer may not be as clear or specific as when the legislative authority was written. Others will argue that because of the changes that have taken place in poultry production—particularly integration and the various forms of contract production—any board with the authority to set marketing quotas and possibly prices, should be more representative of the various phases on the industry including, especially, those working more directly with producers, such as hatcherymen, processors and egg grading station operators.

When this authority is placed in the hands of one group—in this case the primary producers—it is essential that the group fully appreciate the responsibility it is assuming. Actions taken by producer marketing boards can have far-reaching ramifications, not only for their own members, but also for all of the allied phases of the industry. It must be appreciated, however, that the development of board programs with the ultimate smooth running liaison between the various related parts will not happen overnight. A change in production and marketing programs as radical as now being experienced in some parts of Canada is bound to develop mistrust, misunderstanding and frustrations.

These problems do not occur solely within a given industry group but can exist between boards of the various provinces unless special efforts are undertaken to avoid such problems. Today, there are still many instances where producer representatives criticize the actions of allied industry, processors complain that the boards are invading their domain, and hatcherymen plead for more understanding concerning the effect of quota changes on efficient hatchery management, etc.

I am confident that as the various marketing boards gain experience, many problems should resolve themselves. Already there are indications that some of the boards are facing these problems very constructively and are taking steps to correct them.

The poultry industry is a pace-setter in agriculture. No other agricultural enterprise can increase production so easily and so quickly or can change almost any practice or procedure so rapidly. The speed with which these changes are taking place alert us to our respective responsibilities in maintaining our contribution to the industry. In this evolution the industry, to be successful, is dependent upon the

contribution and liaison of each of the allied parts, both industry and government. Producer groups, in the responsibility they are assuming, cannot afford to have the hatchery group, the processor group or the egg grading station operator group in anything but the most efficient operating condition.

In the process of developing 'supply management' or 'controlled marketing' on a provincial basis, considerable interest has been focussed on the need for devising a related program on a national scale as a further means of achieving the stability that is desired. Several industry groups have indicated their desire for organizing on a national basis through the formation of national councils and federations. By this means, they have achieved the exchange of ideas and other mutual benefits. At present, any disciplining or controls in this regard must be on the basis of a 'gentleman's agreement'. Among boards at this particular level, a 'gentleman's agreement' can be reasonably effective, but it does not achieve the regulation considered necessary with respect to inter-provincial trade, particularly while some provinces still do not have boards.

The egg producers and the Canadian Turkey Federation have already requested the organization of national marketing agencies.

The proposal for the formation of a national marketing agency for eggs is now receiving extensive study. Many discussions have been held, involving producers, federal and provincial ministers and officials, and industry representatives. The areas discussed included objectives, powers and method of operation, relationship of any national agency with



*Graded eggs attractively merchandised have consumer appeal.*

provincial boards and the delegation of authority by federal and the provincial governments.

In view of the extensive details involved in the study, I am inclined to think that it will be necessary to first act upon the recommendation for a national body for eggs before other poultry commodities can be considered.

With controlled marketing, involving supply management, expected to be extended from the provincial to the national level, we can be embarking on a very important phase in the evolution of the poultry industry of this country. The programs that are being considered today must be carefully thought out and all ramifications carefully considered.

Dr. U. Walker, a Canadian agricultural economist, states in his writings that the positive effects of commodity marketing boards are stability and economic security. Under stability, controls are exercised over output and possibly on prices; under economic security, there are short-run benefits to producers in some sectors of agriculture through quotas on their output. The reduction of uncertainty in producers' use of resources and planning is beneficial. Quotas have resulted in short-run gains in the earnings of farm operators who may not otherwise have shared directly in the national prosperity. Some of the negative effects include such factors as limitation of new entries into the business, capitalization of quota rights, problems over size of producing units and quotas, uncertainty of annual size of quotas, penalty on efficiency and frequently the rewarding of inefficient producers. However, in spite of functional and institutional limitations, there are tremendous possibilities for marketing boards to contribute toward a rationalization of the marketing of Canadian farm products.

Dr. Walker concludes that the nature of the demand for a product will strongly influence the effectiveness of quota control. New substitutes are appearing at a fast pace. New manufacturing processes are changing a relative demand among farm commodities. He suggests that if soybean products that taste and chew like boneless chicken take hold of consumer habits, quota controls over broiler production will be only a short-run benefit. He also indicates that there is no better way to bring in the substitutes quickly than to stabilize the price of the product they would be competing with.

The difficulty is how to partly stabilize prices with enough indirectness to leave in some market flexibility. Innovators in the form of new producers and suppliers, who may be more efficient, are needed if economic deterioration in the industry is to be avoided.

There is a natural tendency to criticize before a program is instituted. Constructive criticism is important as we move toward an improved program and we must be prepared to strengthen it as experience is developed.

The men involved in developing the various provincial board programs and those involved in the drafting of recommendations with respect to the proposed national body do sincerely have the interests of the industry at heart. It is understandable that in the preliminary undertaking of drafting such proposals, there is bound to be quite a wide divergence of opinion. Some are inclined to very provincial concepts and some proposals emphasize the need of greater centralized authority. This movement has developed out of a number of years of 'boom-and-bust' cycles, probably more often 'bust' than 'boom', and answers are being sought. There already has been and will continue to be an increasing tendency to broaden the ideas respecting these programs.

In my opinion, if this entire national program and the related provincial programs are not approached in the interest of a strong national poultry industry that is prepared to be competitive, the alternative is the balkanization of this country into individual, self-sufficient, provincial units without concern for natural marketing areas based on years of development. This could kill competition from the most efficient producers or areas and thereby herald serious reverses for the industry.

I believe that most of us, who are seriously involved with this industry, are sincerely interested in economic stability. Differences of opinion arise as to the method of achieving that stability. We passed through various stages in the attempt to maintain some form of balance between supply and demand and also some form of balance between the industrialization of the poultry industry and the changes in the socio-economic aspects of our life. Regulated supply management will likely play a much more prominent role during the next period of this evolution.

Supply management is not a magic word. There can be many ramifications. There can be problems that relate to the domestic situation and to our position in the international picture. Some have stated that import control will be an absolute essential to the success of supply management. I believe that one will not necessarily come automatically with the other.

I feel certain that it is not impossible for the poultry industry—subject as it is to competitive pressure from many sources—to maintain its competitive position with a program involving production planning or supply management, and to match raw materials with the demand. However, to achieve this will demand foresight and careful planning, fortitude and discipline, and complete cooperation with a proper sense of understanding and trust among the various segments and regions of the industry. It will also require the utmost of mutual understanding and cooperation between industry and governments. ■

# A SCIENTIST *SPEAKS OUT* ON RESEARCH....

B. B. MIGICOVSKY

Étant donné le coût élevé et l'extrême complexité de la recherche, un scientifique est d'avis que les recherches devraient obéir à un plan organisé, de préférence par les chercheurs eux-mêmes.

The winds of change are drafting through the halls of science.

It seems that as we probe deeper into the wells of knowledge, the cost of discovery increases by leaps and bounds. The fact that 95 per cent of all scientists who ever lived are alive today is an indicator of what has happened in science. This situation necessitates new organization, new direction, and new administration.

The sacred cow of science is dead and buried. Society no longer worships at its shrine. Instead, society asks: "What have you done for me lately?"

How will agricultural research reconcile itself to the new rules of the game? I suggest we must learn how to manage our resources more effectively, we must shed our narrow loyalties and biases, and cooperate in the formulation of national plans and programs.

Decisions must be made as to how much we should spend on research; how much should go to medicine, to agriculture, to transport, to atomic energy; how much to support research at universities for student training; how much to cereal research; how much to fisheries in the Atlantic, the Pacific and waters in between. What are the priorities? Is turning out Ph.D's in chemistry more important than learning how to communicate by satellite? If Ph.D's in chemistry are important, how many, and where?

Dr. Migicovsky is Director-General, CDA Research Branch, Ottawa, Ont.



These are the kinds of decisions that have to be made and they cannot be made lightly nor intuitively. The decisions require information and understanding, a great deal of wisdom, and a broad knowledge of science and scientists.

Scientists must play the key role in the over-all management of science. If scientists do not move to the front of the bus they will find that non-science trained efficiency experts will be making decisions instead of advising the scientist decision maker. Some scientists will have to learn the techniques of management by reading, thinking, or taking courses—no matter how. I believe scientific research must be managed by people who know science, know how to do research, and above all know scientists.

Science has had to compartmentalize knowledge as it grew in content and complexity. Today we have names for scientific disciplines that did not exist 50 or even 25 years ago. Many of them are interdisciplines but each one has its own specialists—all of them necessary to further our understanding, to make new discoveries, and enable progress.

With the growth of the number of disciplines and specialties, universities have to expand the number of departments and faculties, and grant appropriate degrees. Once happy professors have become heads of departments and deans; government laboratories have created new sections and provided more services.

We are driven to distraction when we hear the term “viable mass” which is another way of saying two more associates, two assistants, and four technicians. This mitotic and meiotic phenomenon as applied to science, where disciplines fragment and recombine to form new ones, requires controls we did not need in the past. This explosion in scientific research, so exciting and so potent with possibilities, must be in large part regulated and directed if we are to derive maximum benefit.

It is obvious that the old ways of scientific research have changed. The scientist of 25 and 50 years ago is passé. He was able to read all the literature pertaining to his discipline. He could even maintain an abstract file. His equipment was relatively simple; in fact, he built some of it himself and he brewed his own coffee—a primitive picture.

This new wind blowing through the corridors says scientific activity must be managed, must be justified, must be planned and programmed. And scientists must not protest this dictum. They may well point with pride at the magnificent progress made when left more or less alone. Scientists may well argue that Newton, Harvey, Darwin, Einstein were not managed and were not requested to prepare a cost/benefit analysis nor to submit plans and programs. Though they had other crosses to bear, they did not require \$60,000 microscopes, modern buildings, computers, neutron generators, information retrieval systems, and automatic coffee makers.

What about the future for research in agriculture?

It promises to be productive and innovative. Probably no great advances will take place in sophistication of equipment or laboratory methodology. We can expect to see a belated adoption of the sophisticated methods and techniques presently available and an application of the recently acquired knowledge to research on behalf of agriculture.



*Land variability. The inventory of Canadian soils has progressed to a point attained by few other countries.*

In the past, the two broad areas of research which directly affected agriculture most were plant and animal breeding, and genetics which produced new and improved varieties of crop plants and animals, and agronomy which made possible the advances in crop management. These research areas would have been static without the knowledge gained by research in the biological and physical sciences, whether or not under the auspices of Agriculture.

For the future, I foresee increased activity in ecology. Computers will enable scientists to extend their studies of the ecosystems and better understand the relation of the unit to the whole. For example, the insect pest will be studied as a part of its total environment. This increased knowledge in ecology, coupled with intensive research on physiology and biochemistry of the pest, will lead to more effective methods of nonchemical control. Advances in physics and chemistry will put new tools into the hands of biologists, as did ionizing radiation which made possible the sterile-male technique for screw worm control and holds promise for control of codling moth in British Columbia.

Research in biochemistry and physiology will discover specific targets for control in insects, allowing for use of a specific chemical control agent which will be non-toxic to warm blooded animals.

Success can be visualized in the field of animal reproductive physiology. A breakthrough in this field could enable us to produce twin calves at will,



*Pollinating tomatoes. The prospect of cheaper energy will give impetus to the glasshouse production of food scientist claims.*

thus increasing the calf drop and the efficiency of animal production. More intensive animal production will be practised and new problems of nutrition and management will be faced. Engineers will be active in the study and design of animal housing and controlled environments in order to cope with the advanced methods of raising animals.

Further intensification of agriculture will present us with entirely new problems. New disease organisms and new vectors of disease will keep our pathologists very busily engaged in research in mycology, bacteriology, and virology.

Engineers, if we have enough of them, will bend their efforts to devising new and efficient automated machinery for all the tasks carried out in the production of food. It is most essential that agriculture become more efficient in the use of manpower, and automation is part of the answer.

If the energy boys succeed in their accomplishments and energy becomes cheap enough, it will be a great impetus to the glasshouse production of food. Plant physiologists and engineers will have to turn their efforts in this particular direction.

Within the next 15 years we will know the biochemical basis of drought and frost resistance. Coupling this knowledge with the additional information coming from the geneticists and soil scientists, we will be able to cope with these two environmental hazards more effectively.

These are a few of the goals we hope to achieve in the Research Branch. It doesn't include marketing and economics. But we will have to use our best brains and put forward the greatest effort in these areas as well if agriculture is to become the viable and successful industry this country sorely needs.

If we organize successfully and our research in the future is as productive as it has been in the past, we will have a partial solution to the problem of world hunger and an equitable income for the agricultural producer—in short, a thriving agricultural industry.

The government has displayed wisdom by appointing scientifically trained people as senior officers in science-based departments. Also, the government displayed excellent judgment in appointing Dr. O. M. Solandt as Chairman of the Science Council of Canada and Dean Shebeski as member of that Council.

We are fortunate that in agriculture we have an excellent organization called the Canadian Agricultural Services Coordinating Committee (CASCC), made up of provincial Deputy Ministers, Deans of Agriculture, and CDA officers. The combined wisdom of these people will ensure a research effort in Canada on behalf of agriculture which will produce the maximum progress and at the same time provide the scientist with an opportunity for a satisfying career. It is hoped that we will succeed in managing the research effort without over-managing the research scientist, and continue to give him the kind of freedom he needs to do effective research.

It is only in relatively recent years in Canada that we have established institutions and university faculties where knowledge can be gained and applied to the development of agriculture and the solution of its problems—also where we can become aware of knowledge *discovered elsewhere* in the biological, physical, and engineering sciences. We need the experts here in Canada, not only to discover new knowledge and apply it, but also to keep abreast of discoveries made *elsewhere*.



*The erucic acid-free Oro rapeseed released in 1968 possess desirable properties as an edible oil.*

## THE IMPACT OF SCIENCE—IN BRIEF

In Canada, plant scientists have produced hundreds of new varieties of grain, forage plants, vegetables, oil seeds, fruits, and ornamentals which can be grown successfully in our diverse and harsh environments. One particular accomplishment is the erucic-acid free Oro rapeseed released in 1968 which possesses highly desirable properties as an edible salad oil.

Rapeseed meal as a feed for livestock has been successfully investigated.

Rapeseed meal will be used as a human food, if the work at the CDA Food Research Institute is able to demonstrate feasibility from a cost point of view.

Genetics has contributed to the increased productivity of our animal products, beef, pork, milk, poultry, eggs.



*Some 2,500 different soils have been characterized, and assessed in terms of suitability and capability.*

The Lacombe hog breed provided the first opportunity for systematic use of hybrid vigor.

Breeding systems worked out for poultry take advantage of heterosis, and result in substantially improved performance—from 146 eggs to 200 eggs per bird for the commercial chicken.

The study of soil enables us to plan intelligently the use of our most important resource.

The inventory of Canada soils has progressed to a point attained by few other countries. Some 260,000,000 acres have been studied, classified and mapped, and some 2,500 different soils have been characterized. The soils are assessed in terms of their suitability for various purposes and their capability to produce crops under a given climatic environment.

Couple our knowledge of soil management with the research on water movement, soil-plant-water relationships, and you have the means of coping with the Western Canadian desert.

Research on pathogenic microorganisms and their epidemiology has enabled us to control many plant and animal diseases.

Growth of the science of chemistry enables us to avert the crippling losses due to weeds, insects, and insect-borne diseases.

The accumulated knowledge of insect taxonomy, physiology, and ecology enables us to use potent insecticides intelligently.

The National Insect Collection is providing an invaluable taxonomic service to entomologists in Canada and throughout the world.

Areas where we need to do more work include engineering, statistics and computer science, physiology, biochemistry and pathology of plants and animals, environmental relationships, agronomy, and many more. ■



# Optimum conditions for storing strawberry plants

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Pour s'assurer de la meilleure conservation possible des plants de fraisières en entrepôt, il faut les refroidir sans tarder. En abaissant à  $-1.1^{\circ}\text{C}$  ( $30^{\circ}\text{F}$ ) la température de l'entrepôt dans les cinq à quinze jours qui suivent l'arrachage, on peut réduire à moins de 2 p. 100 les pertes par moisissure en entrepôt frigorifique, et cela pour une durée de conservation allant jusqu'à six mois.

In Nova Scotia a fungus known as *Typhula* which grows at low temperatures attacks and kills strawberry plants in cold storage. In our investigations at the CDA Research Station, Kentville, N.S., we found that losses have generally been under 2 per cent but in the 1966-67 storage season 11 per cent of the stored plants were lost because of mold caused by this fungus.

Considerable variation in survival of strawberry plants in the field have been reported by growers who have planted molded cold-stored plants. Plant survival has varied from zero to 100 per cent. In May

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1967, *Typhula* was also found growing on overwintered strawberries under mulch in three commercial fields, but no losses were attributed to these field infections since subsequent conditions were such that the disease did not develop.

*Typhula* is a white fungus that is favored by low temperatures for growth. It grows slowly at  $-1.1^{\circ}\text{C}$  ( $30^{\circ}\text{F}$ ) and growth ceases above  $18^{\circ}\text{C}$  ( $64.4^{\circ}\text{F}$ ). *Typhula* produces two types of spores, microconidia



*Typhula* growing on potted strawberry plants.

and basidiospores. Numerous microconidia are sometimes found on the fungus mycelium in culture on artificial medium and on severely infected plants.

Recently, we found basidiospores, arising from mycelium, in artificial culture as well as on the soil near crowns of inoculated strawberry plants three weeks after they had been transplanted outdoors in late October. In addition to spores, the fungus produces black resting type structures called sclerotia. The sclerotia are slightly larger than a strawberry seed. The role of both types of spores and that of the sclerotia are not fully understood, although it is suspected that the basidiospore stage may be infecting plants in the fall when strawberry plants are dug for cold storage. The sclerotia have a hard rind with a soft granular inner structure. *Typhula* sclerotia usually produce spore-forming structures on which basidiospores are formed but so far we have not



Cold stored strawberry plants; variety Redcoat. Healthy bundle on left and bundle infected with *Typhula* on right.

observed this type of spore production either in artificial culture or under natural field conditions.

Our research revealed that the fungus grows slowly on strawberry plants held in a  $-2.2^{\circ}\text{C}$  ( $28^{\circ}\text{F}$ ) storage which maintains the recommended plant temperatures of  $-1.1^{\circ}\text{C}$  ( $30^{\circ}\text{F}$ ). The temperature of plants is higher than ambient room temperature due to heat released by the plants. We have observed traces of *Typhula* on root lesions three months after the plants have been in commercial cold storages but it takes five to six months for the mold to completely grow over a bundle of 25 plants. We have been able to reproduce similar mold growth in the laboratory by inoculating strawberry plants with mycelium of *Typhula* and holding them in cold storage for three months.

The problem of mold development results from storage conditions where the plants are not cooled quickly enough after being placed in cold storage. This may happen when refrigeration is not adequate

or when the crates of strawberry plants are stacked too close for good ventilation and heat removal. Losses from mold in storage for six months may be prevented or reduced to less than 2 per cent by cooling plants to  $-1.1^{\circ}\text{C}$  ( $30^{\circ}\text{F}$ ) in five to 15 days after digging. Most mold losses have occurred when it took 15 to 75 days to reach the recommended storage temperature.

Experiments to control *Typhula* on cold-stored strawberry plants by means of controlled-atmosphere storage or pre-storage fungicide treatments have not been satisfactory. Our laboratory studies at Kentville revealed that the growth of *Typhula* mycelium on artificial media could be inhibited when held in controlled atmospheres of 10 per cent  $\text{CO}_2$  and 5 per cent  $\text{O}_2$  but the same concentrations would not inhibit the growth of *Typhula* on inoculated strawberry plants in cold storage. We found that fungicide pre-storage treatment of strawberry plants prior to inoculation with *Typhula* did not prevent the growth of *Typhula* on the plants in cold storage. Our research revealed that a pre-storage dip treatment with Tetrachlor plus Captan partially reduced mold



Survival of cold-stored Cavalier strawberry after five months in storage. Healthy (right) and inoculated with *Typhula* (left).

growth. Plant survival was excellent but further tests are required before the treatment can be recommended.

Where molded plants have been used by growers, plant survival in the field has been reported as variable. In our tests we have found that the fungus requires a long growth period to kill strawberry plants. Plants infected in storage for three or four months grow normally but if held longer, plant survival is reduced.

*Typhula* is favored by high humidity for growth but collapses and dries up on the plant under field conditions. ■

A new concept in valuing hog carcasses has been introduced by CDA. This meat grader is taking a total backfat measurement, which will be correlated to weight to determine an index and value of the carcass (see article page 8) .

Le Ministère de l'Agriculture du Canada a mis au point une nouvelle méthode d'évaluation de la valeur des carcasses de porcs. Cet évaluateur mesure l'épaisseur du lard dorsal qui en relation avec le poids total de la carcasse, déterminera l'index de la valeur marchande ( voir l'article page 8) .

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