the
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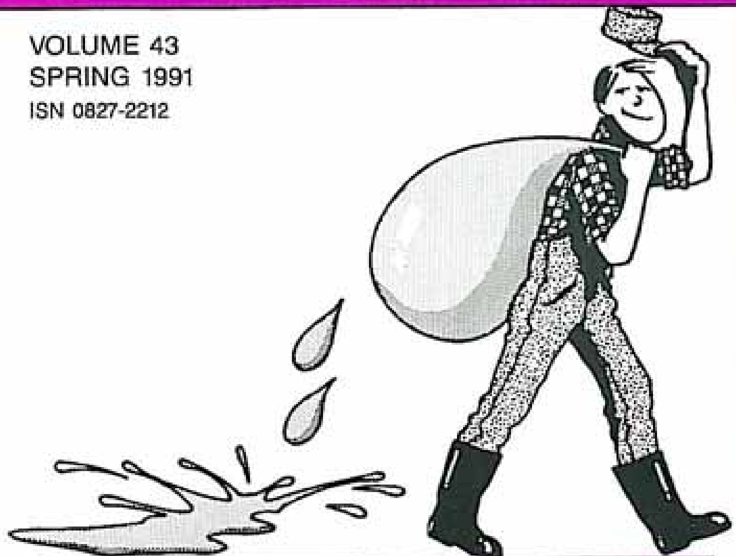

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THE STUBBLE MAKER

Erosion Control Using Oat Straw

Ever thought of creating your own stubble field to prevent water and wind erosion while waiting for grass to grow on newly constructed steep hard packed embankments? June Carrington, a consultant overseeing site restoration at the Oldman River Dam site has, and hired Alberta Agri-Services Ltd. of Olds, Alberta to create a "stubble field effect" on the downstream slopes of the dam. "Keeping the topsoil in place until plants take hold will be a very big challenge on the 1:3 side slopes. Wind velocities are high across these huge embankments," she concludes.

Alberta Public Works elected to go with a unique restoration plan. Carrington says that "native prairie topsoil from the area was stripped and placed to a depth of 150 mm on the slopes of the embankment. We hope there are enough propagules in the soil to establish native flora within a couple of years." To get some vegetation growing almost immediately, Carrington had 10 kg/ha of oats sown along with 5 kg/ha of Slender, Western and Northern wheat grasses. After seeding, Carrington next had straw spread over the seed bed followed by crimping.

Ken Schaber, owner of Alberta Agri-Services Ltd. designed and built his own "stubble maker" or Crimper as he prefers to call it. He has a patent pending. His Crimper attaches to a tractor's three-point hitch and looks

June Carrington and Ken Schaber examine oat straw after "Crimping".

Overview of downstream slopes of Oldman River Dam. Light areas have straw spread and await Crimping.

much like an ordinary farm disc. Its twelve discs spaced 200 mm apart can independently fluctuate up or down. Ease of operation is important to Schaber, the independent discs allow his machine to turn on steep slopes and in a six-metre radius.

After seeding, says Schaber, "we spread good quality oat straw over the entire area. Oat straw is used because it is more flexible than wheat or barley and less likely to break when it is "hairpinned" into the ground by the Crimper," he adds. Hairpinning the straw is accomplished by the Crimper's discs cutting the ground and pushing straw in to a depth of about 40 mm. Upon completion of one pass with the Crimper, the area takes on the look of a stubble field with its straw standing vertical in neat 200 mm spaced rows.

Chopping and blowing oat straw.

Schaber says, "the cost of seeding and crimping ($1200/ha) versus hydro-seeding at $27-2800/ha makes this a very viable alternative for steep canal embankments."

Carrington hopes to have a good stand of native vegetation growing back on the slopes by next year, however, she concedes it may take a couple years.

For more information please contact June Carrington at the Oldman River Dam Site at telephone (403) 627-3765 or Ken Schaber of Alberta Agri-Services Ltd., Olds, Alberta at telephone (403) 556-2084. ■

Editor's Note: Two weeks after seeding, germination of the wheat grasses and oats can be seen across the slopes.

NOTICE

CIRCLE YOUR CALENDAR DATES!

Here's your early notice to mark your calendar dates for the forthcoming

ANNUAL ALBERTA IRRIGATION PROJECTS ASSOCIATION CONFERENCE

It's a two-day format this year scheduled for November 19th - 20th at the Lethbridge Lodge.

The proposed theme is: "Managing Water — A Limited Resource in a Changing Environment". ■

IRRIGATION SYSTEM EVALUATION PROGRAM

The irrigation branch of Alberta Agriculture has several programs aimed at increasing water-use efficiency. One of these programs is the irrigation system evaluation program. The overall objective of this program is to help farmers evaluate whether their irrigation system is providing an adequate amount of water to meet crop demands.

At the request of the farmer, a preliminary assessment of the system's adequacy is done by the irrigation branch district office staff. This entails a check on the design of the system, collection of data on the system and the soils. If this assessment indicates that the system may be deficient, field testing is carried out.

During the field testing, flow, pressure and fuel consumption measuring equipment are installed in the irrigation system, says Vincent Ellert, an irrigation management technologist with the irrigation branch. "Pressures are measured at the pump and at some of the sprinklers. The total system flow rate is measured under at least one operating condition. Using these measurements, the useful power developed by the pumping unit is calculated," he adds.

The rate of energy consumption is measured. By comparing the energy consumption rate to the power developed, an overall pumping efficiency can be calculated. This efficiency is then compared to the efficiency of other units of the same fuel type. This comparison is useful in evaluating the performance of the pumping unit.

The net amount of water applied per irrigation is calculated and compared to the crop water-use information.

Technologist Vince Ellert conducting pump test.

Over the past 11 years more than 500 units have been evaluated. The most common problem is the misapplication of equipment. In many situations the pump or power unit used is not applicable to the job. In many cases the farmer is not applying the amount of water per application that he thought he was applying. By learning their actual energy consumption rate, farmers are able to compare the costs of alternate energy sources.

By providing the farmer with information concerning his energy use and water application, more efficient use of irrigation water can be accomplished, says Ellert. "In many situations, increased system performance, resulting in enhanced production, does not require system modifications, only a change in management," he adds. Ellert says this program is geared to providing information which the farmer can use to make management decisions.

For more information please contact the Irrigation Specialist in your area. ■

IRMAA BBS UPDATE

Effective June 1, 1991 the access telephone number for the IRMAA BBS (Irrigation and Resource Management division Alberta Agriculture Bulletin Board System) will be (403) 329-0286. IRMAA is available 24 hours/day seven days/week.

The bulletin board is targeted for the general irrigation community with Alberta Agriculture staff, farmers, irrigation district staff, agribusiness, and consulting firms as potential users.

The IRMAA BBS information (bulletins) consists of four main areas:

1. Events Calendar
2. Water Supply Outlook and Climatic Information
3. Division Information Package
4. Other Miscellaneous Information

Users can display the information to the screen or the information can be downloaded to the user's system for browsing offline.

If you have any questions, comments, or suggestions, or would like a copy of the IRMAA BBS User Instructions please contact Pat McIlhargey, Information Systems Analyst, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5855. ■

ALGAE IDENTIFICATION IN IRRIGATION SYSTEMS

Fresh-water algae are simple plant forms, meaning that single plants are not differentiated into separate functional parts such as roots, stems, leaves, or flowers. Individually, algal plants are extremely small. Often a microscope is needed to identify the different types. How then, can such tiny simple plant forms seriously impact on the operation of an irrigation system? The answer, says Robert Burland, a biologist with the pollution control division, Alberta Environment, can be found in the old cliché "there is strength in numbers". "The "problem" species of fresh-water algae," states Burland, "can grow and multiply so quickly that before we realize it, problems are being caused."

In irrigation systems, algae are responsible for affecting flows in concrete lined canals, and for plugging equipment such as pump screens and trash racks. In ponds and lakes, algae can taint the water so that it is unpalatable. Algae can cause fish kills by depleting oxygen and can even impart toxic substances into the water.

Although there are thousands of species of algae that exist in fresh water, it is possible to group them into three categories: filamentous, planktonic, and branching, based on their general characteristics.

The type of algae that raises the most havoc in irrigation canals is the filamentous type, says Burland. When checked under a microscope, individual filamentous alga look like slender filaments or threads. The filaments may have branches and may have a single "hold-fast" cell at one end enabling attachment to rocks, concrete, or other objects.

When seen collectively and in abundance, the filamentous algae appear as long stringy masses attached to objects or to other vegetation. In the standing waters of ditches, lakes, or ponds, filamentous algae appear as a cottony mass or surface scum that is filled with air bubbles. The filamentous algae vary in color from green to yellow.

Filamentous algae that are of concern in irrigation canals begin growth attached to concrete, rocks, or other plants. As they grow and multiply via cell division, the entire mass of algae becomes such that current, wind, or wave action may cause large chunks to break off and float away. Individual filaments may also break off and float downstream. It is these free-floating pieces and chunks that "wrap around" underwater structures, and in general, plug things up. Because their stringy nature results in this "wrap around" effect, algae are very difficult to clean off.

Filamentous Algae

Filamentous algae can reproduce and spread in several ways. The individual fragments of algae are capable of reproducing and forming additional algal masses in other locations. They may also form spores which can move to other areas and begin new colonies. The spores which are resistant to drying and freezing are the means by which algae can survive periods of drought and cold weather such as during the winter draw-down season. Both fragments and spores can also be moved from place to place by waterfowl or other aquatic life.

Planktonic and branching types of algae may cause occasional problems in canals, says Burland, but are more of a concern in lakes and ponds. The planktonic forms of algae are free floating so they are not able to establish themselves in flowing systems. In lakes, reservoirs and ponds, however, these types of algae can cause serious problems, he states.

The most notorious of the planktonic algae are the blue-greens. Under the right conditions, blue-green algae can multiply so rapidly so as to cause the water to look like pea soup. This is referred to as an algae bloom. When this happens, oxygen depletion can occur, causing a fish kill. Some types of blue-green algae can add toxins to the water under bloom conditions, making the water poisonous to livestock.

The branching algae are larger in size and appear to have stems and branches. They are often crusty in texture as a result of calcium deposits and have a skunk-like odor when brought into the air. Branching algae (Chara is the most common type) inhabit the bottom of lakes, ponds and streams, are attached to objects and grow only one to two feet in size. Chara does not normally become a problem in canals, says Burland.

For more information please contact Robert Burland, Pollution Control Division, Alberta Environment, Provincial Building, 200 - 5 Avenue South, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5511. ■

SALINITY MAPS OF IRRIGATION DISTRICTS COMPLETED

Salinity maps for 12 of the 13 irrigation districts in Alberta have recently been completed and are available at scales of 1:50,000 or 1:100,000. These colored maps, based on data collected during the 1980's as baseline data for irrigation rehabilitation planning, provide a comprehensive inventory of the extent, location and severity of saline and/or waterlogged land within the irrigated and associated dryland areas in southern Alberta.

Mapping of saline/waterlogged land was conducted by Alberta Agriculture and Prairie Farm Rehabilitation Administration (PFRA) using two different methods. Maps for the Eastern (EID), Western (WID), Raymond (RID) and Magrath (MID) Irrigation Districts were derived from level III land classification maps prepared by Alberta Agriculture. Affected areas were delineated by soil specialists and private consultants on the basis of air-photo interpretation, soil sampling and field inspections. Inventories of the saline/waterlogged land within the other irrigation districts were compiled by PFRA and were based on visual mapping conducted through field inspections and air-photo interpretation.

Both methods identified affected land within irrigated and dryland areas as being either moderately or severely affected. "Irrigated" blocks consist of parcels containing acres assessed for irrigation, with dryland acreage being dominant in some quarters. "Dryland" blocks are basically dryland farmed, but may contain some small, irrigated parcels and may be crossed by irrigation canals.

Specific sources of salinity/waterlogging have not been determined and require further investigation, inasmuch as the causes of salinity and waterlogging are complex. Salinity and/or waterlogging within irrigated areas is generally related to seepage from canals, improper water management, poor irrigation practices or inadequate drainage. The main causes of salinity within dryland areas are growth of cereal crops in place of native range, summerfallowing and impediments to surface drainage that trap snow and water.

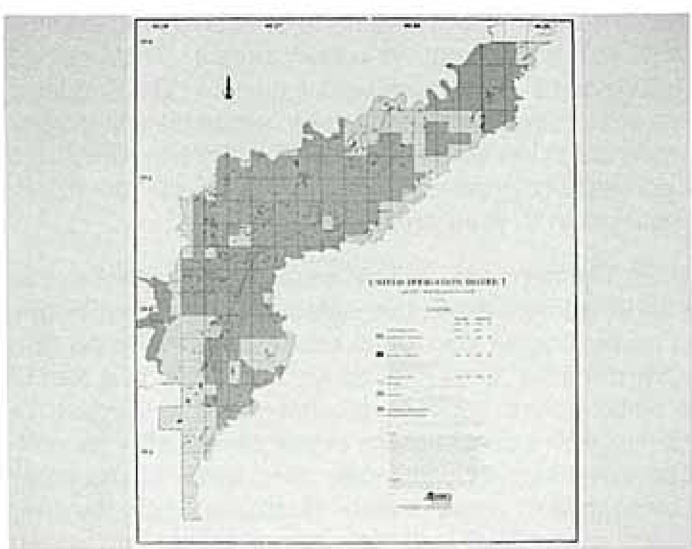
The total acreage of saline/waterlogged land within the 1.6 million acres investigated in the irrigated blocks was 201,670 acres, or 12.4%. Estimates for the total area affected within the irrigated blocks of individual irrigation districts range from 2.4 to 25.3%. Total affected land within the dryland blocks was 238,050 acres, or about 13.5% of the 1.8 million acres investigated. Affected acreages within the dryland blocks associated with individual irrigation districts range from 1.2 to 26.8%.

Detailed comparisons of the affected acreage within the irrigated and dryland areas, or among irrigation districts, should be made with extreme caution, due to the diversity of site-specific soil and natural groundwater conditions that exist within the areas investigated. For example, many of the affected areas are associated with depressional areas or natural drainage courses that were affected by salinity and/or waterlogging prior to irrigation development.

Salinity maps are intended for use in planning further rehabilitation of irrigation distribution systems and in promoting reclamation of saline/waterlogged land. Continuation of the irrigation rehabilitation and expansion program will facilitate installation of additional seepage control measures. Improved surface drainage, installation of subsurface drainage systems and conversion of some irrigation systems to more efficient methods of irrigation all have served to reduce the extent and severity of salinity. Level II land classification and irrigation impact assessments also encourage responsible development of land for irrigation in the future.

Funding provided by PFRA and irrigation council for the preparation and printing of these maps is greatly appreciated.

Further information and copies of the salinity maps may be obtained from Frank Hecker at telephone (403) 381-5890 or Art Potvin at telephone (403) 381-5855, Land Evaluation and Reclamation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. ■



United Irrigation District Saline/Waterlogged Map.

FROM THE FARM PERSPECTIVE

Soil Erosion

Soil erosion by wind is synonymous with loss of productivity and reduced yields. Wind effects are, however, farther reaching than the exposed field. Aside from burying crops, drifting soil can create serious problems in irrigation districts by filling ditches and canals, plugging culverts and structures and generally increasing maintenance costs. According to the Bow River Irrigation District and Taber Irrigation District alone, thousands of dollars are spent each spring in removing soil deposited into waterways by wind. Landowners who do not take adequate soil erosion control measures must often contribute to the cost of cleanup.

Minute soil particles bouncing across an unprotected surface will dislodge increasingly larger particles downwind of the initially eroded area. The fine, lighter particles become airborne, appearing as dust clouds while coarse, heavier particles accumulate and form drifts.

Two factors which make soils within irrigation districts inherently susceptible to erosion by wind are geographic location and impact on soil conditions due to cropping options. Southern Alberta is not only the heart of irrigation but also the center of chinook winds. With wind velocities of only 21 to 48 km/h necessary to initiate soil movement, high winds commonly experienced in this part of the province can produce devastating results.

Practices which have traditionally been associated with soil erosion, such as summerfallowing, are generally not an issue within irrigation districts. Irrigation has, however, permitted the culture of specialty crops which frequently increase the soil's vulnerability to erosion during the time from harvest to crop re-establishment. This interval usually coincides with seasonal, gusty winds. Problems are compounded when potatoes, sugar beet and other crops which leave minimal amounts of plant residue are preferentially grown on sandy soils which are highly susceptible to wind erosion.

John Timmermans, a soil conservation specialist in Airdrie, demonstrated that oats are an effective means of controlling erosion when used as a cover crop with early potatoes. Oats may be aerial seeded at a rate of 3 bu/ac before potatoes are harvested in August, or planted with a seed drill at a rate of 2 bu/ac after harvest. The advantage of using oats over some of the other potential cover crops is that it is relatively cold tolerant, establishes quickly in the fall, does not recur and breaks down quite readily by spring. Alternative soil erosion control methods may be necessary if late potatoes are grown with insufficient post-harvest time to establish a cover crop. Lister shovels, attached to the back of a cultivator, have proven effective in creating ridges and furrows in light, sandy soils. An uneven surface serves to intercept the wind and prevent it from traversing the field at erosive velocities.

Soil erosion problems may also arise when the corners of fields irrigated by center pivots are cultivated and left exposed. Demonstration plots in the M.D. of Taber indicated that planting barley under-seeded to grass or alfalfa as a permanent cover provides a viable means of protecting pivot corners from the effects of erosion by both wind and water.

The enactment of the Soil Conservation Act in Alberta enforces the requirement for proper management to avoid soil degradation. Landowners may get assistance in controlling soil erosion by contacting their local agricultural fieldman who will provide expertise, equipment rental and, in some cases, seed for cover crops. Owner liability can also be avoided on leased land by writing a stipulation into the rental agreement which specifies cropping or management practices that deter soil erosion.

The price of soil erosion is paid by landowners, irrigation districts, local counties, M.D.'s as well as the respective area public. It is therefore an issue to be continually addressed by equally as many industry players.

For more information please contact Marion Rigby, P. Eng., Irrigation Specialist, Alberta Agriculture, P.O. Box 588, Vauxhall, Alberta T0K 2K0. Telephone (403) 654-2161. ■

PHOTO: JACK PAYNE

Soil erosion by wind: effect on irrigation district waterway.

BULLSHEAD CREEK SPILLWAY NEW GST REVETMENTS

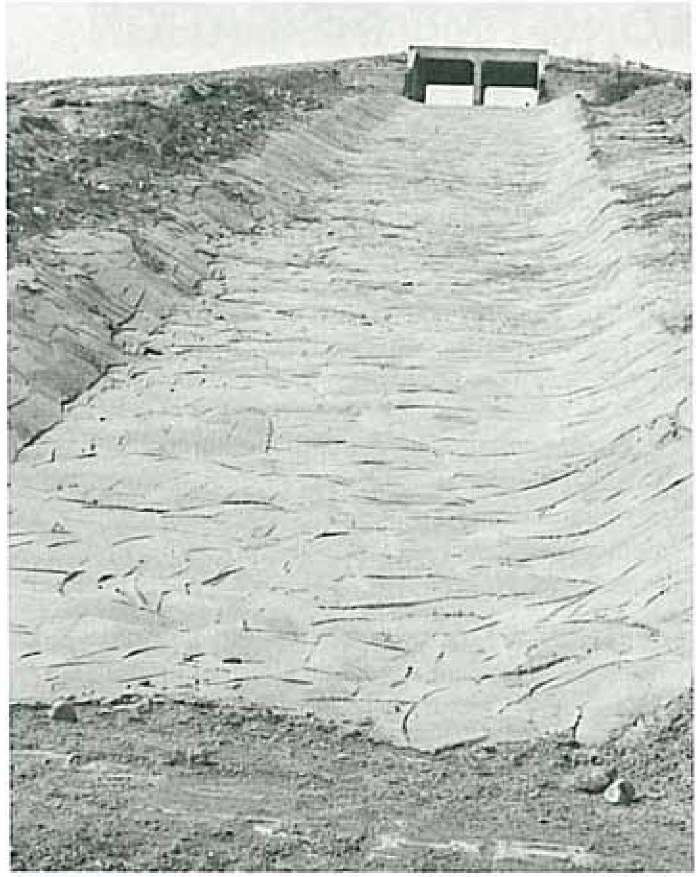
As described in volume 38, winter 1990 edition of the Water Hauler's Bulletin, the St. Mary River Irrigation District (SMRID) installed a GST revetment chute spillway in the fall of 1988. The spillway was designed for a working flow of 2.2 m^3/s and was set on a slope of 1:3.7. This product was installed at significantly less cost than of a reinforced concrete chute spillway.

Monitoring showed three problems. One was due to minor damage caused by the hydraulic jump. The second was settlement of the revetment blocks directly above the timber anchor system. The design of the timber anchors makes it difficult to get enough soil compaction to eliminate settlement. This settlement, while disconcerting, did not appear to be causing short-term damage. The third was that the celled blocks showed signs of deterioration.

In the winter of 1990/91 the chute blocked with snow. A February chinook resulted in significant runoff which had to pass over the chute. The snow diverted the water over the edge of the chute midway down its length. The water then flowed under the geotextile and swept the gravel sub-base downward and onto the ice. The revetment was held in place by the soil anchors. Nevertheless severe damage resulted to the lower portion of the chute. This would likely not have occurred had the chute been reinforced concrete.

Furthermore GST revetments had been used for drain inlets along the main canal. Some suffered serious subbase erosion from very limited flows and required grout repairs.

Note extensive damage to Bullshead Creek spillway.



Spillway after sealing the surface and pumping grout underneath.

Repairs are underway, consisting of suspending the revetment mats, sealing the surface and pumping grout underneath. The chute will still be functional but is being supplemented by a pipe spillway intended to carry operating flows. The chute will only pass emergency flows.

While the GST revetment has a substantial cost advantage over a reinforced concrete chute it is vulnerable to this sort of damage. Furthermore the design induced settlement, potential subbase erosion and open cell block construction, leave the longevity open to question.

For more information please contact Ron Renwick, P.Eng., St. Mary River Irrigation District, P.O. Box 278, Lethbridge, Alberta T1J 3Y7 at telephone (403) 328-4401; or Jack Ganesh, P. Eng., Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7 at telephone (403) 381-5869. ■

CONGRATULATIONS FINN MCPHERSON

Congratulations to Mr. Finn McPherson on your appointment to the position of Manager of the Bow River Irrigation District.

LONG-TIME IRRIGATION SUPPORTER RETIRES

After over 31 years of work and contribution to the development and enhancement of irrigation in southern Alberta, Akos E. Pungor, head of Alberta Agriculture's irrigation branch, has retired.

Akos always considered his work in Alberta's irrigation industry as a career commitment, not just a job, and his first concern has always been for the irrigation producer. Whether it be in overseeing the delivery of programs at the on-farm level or assisting the thirteen irrigation districts, Akos recognized and promoted the valuable contribution that irrigated agriculture made to the Province's economy and water-based needs and enjoyments for all Albertans.

As an Irrigation Emeritus, may we surmise Akos will golf every course in southern Alberta in the summer; spend the winter skiing; and next spring be back helping some farmer-friend or irrigation district solve an irrigation problem. Good Luck!

Akos Pungor

BRID MANAGER RETIRES

Mr. Jake Friesen has retired from the manager's position of the Bow River Irrigation District, after 36 years of services to the district. He started as a very young equipment operator (who was only going to work a few years and then go farming) but was promoted up the ladder, eventually reaching the top position of District Manager.

Jake Friesen

To Jake it's been a lifetime of good experiences, and an education at the grass-roots or hands-on level.

Now in retirement, he wants to devote more time to raising championship quarter horses on his farm east of Vauxhall. Best wishes for the future!

THE WATER HAULER'S BULLETIN

Designed to provide the operation and management personnel of Irrigation Districts with items of interest in their line of work. Comments are welcome. Please contact Duncan Lloyd, editor, at Area Code (403) 381-5539, Lethbridge.

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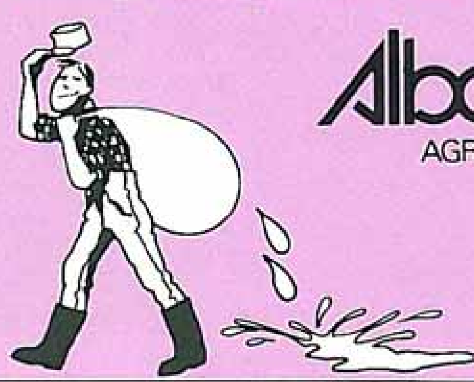

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