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Marketing Cream in Plastic Bags

James L. Olson

MARKETING CREAM IN PLASTIC BAGS

By

James L. Olson

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This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for the degree; but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Advisor

Head of the Major Department

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INTRODUCTION

Because quality directly affects both price and consumption, one of the basic problems facing the butter industry in South Dakota is quality improvement. Under the price support program certain minimum quality standards have to be complied with before surplus butter can be sold to the government. One-fourth of the butter produced in South Dakota does not meet this minimum quality requirement, assuming that conditions have not changed since 1951-52.[1]

Farm separated cream constituted 70.6 percent of the butterfat marketed in South Dakota in 1955. Cream is an important source of farm revenue in South Dakota because it yields a year around income.

On a high proportion of the farms in South Dakota, dairying is only a sideline enterprise, and because of this, farmers tend "to let things go" and do not realize that quality improvement could be very beneficial to both themselves and their creamery. In periods when farm income is low, there tends to be an increase in the sale of cream, but because of the low income, quality is again slighted.[2]

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[1] Ernest Feder, D. F. Breazeale, and Richard Newberg, Quality Aspects of Butter Marketing in South Dakota, South Dakota Agricultural Experiment Station Bulletin 443, 1955.

[2] Ernest Feder and S. W. Williams, Dairy Marketing in the Northern Great Plains, Its Patterns and Prospects, North Central Regional Publication Number 47, 1954.

Marketing and processing cream plays an important part in quality. The smalll producer is at a disadvantage in that he usually does not have the facilities to handle his cream properly. After separating, there is a good chance that this cream is going to stand without refrigeration. The bacteria count increases to such an extent, under these conditions, that cream deteriorates rapidly. If farmers would become quality conscious, and resort to better or more suitable methods of handling, the quality of their cream could be greatly improved.

Such a method could possibly be the shipment of cream in plastic bags rather than cans. This method of handling cream was devised by the Galva Creamery Company, Galva, Illinois. This creamery manager was of the opinion that a better quality cream was obtained when bags rather than cans were used for cream procurement.

Purpose of Study

The purpose of this study is to determine the feasibility of shipping cream in plastic bags rather than cans. Cost and quality differences of the two systems of cream procurement are to be compared in order to determine if conversion from cans to plastic bag is warranted.

Procedure

A case study was used in determining the feasibility of shipping cream in plastic bags. It was felt that this was the best method to obtain the desired information in that the routes to be used in the experiment could be carefully analyzed and the patrons could be questioned as to their reactions and recommendations.

The creamery selected for the study was chosen on the basis of interest shown in the problem, size of the plant, and also because of the ease in obtaining information from the routes. Two of the creamery's five routes were chosen for the experiment. Each of the routes had approximately the same number of patrons and about the same number of miles. A preliminary survey showed the quality of cream on these routes to be very similar. Because of these similarities, the comparison of the two systems of cream procurement was simplified. The experiment was conducted over a six week period during June and July.

Plastic bag kits were supplied to all cooperating patrons on each route at the beginning of each trial period. A direct comparison of quality was made between route A, using plastic bags and route B, using cans for a duration of three weeks.

At the end of the third week this operation was reversed, route A shipped cream in cans, while route B shipped cream in plastic bags the following three weeks. Again, quality comparisons were made between routes as well as comparisons within each route.

Description and Use of New Method

Each cream kit, sufficient to last the average cream producer for one month, consists of six corrugated boxes, 25 plastic bags, one aluminum holder, six 2½ inch tapes, six 2½ inch reinforced tapes, 25 "poly"-strand ties, one strainer and five metal receptacles and lids. Once the producer has obtained this kit, the only supplies that will be needed are bags, boxes, plastic ties, and tape.

In using this kit, the patron puts one of the bags inside the

Fig. 1. Placing plastic bag in receptacle.

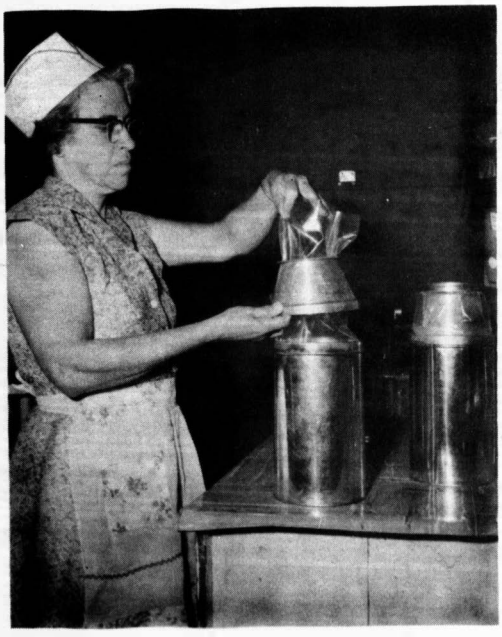


Fig. 2. Drawing bag through holder being placed over receptacle.

Fig. 3. Folding bag over holder and placing strainer on top of opened bag.

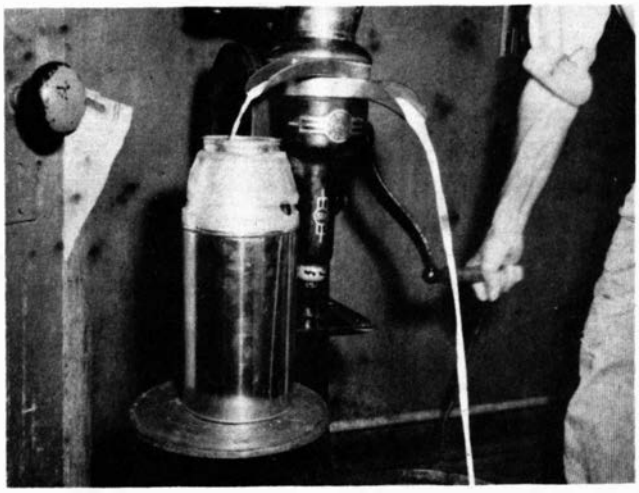


Fig. 4. Separating into plastic bag.

Fig. 5. Storing bags in refrigerator.

Fig. 6. Placing bags in box before shipment.

Fig. 7. Delivery of cream to the creamery.

Fig. 8. Dumping cream from bag into vat.

Fig. 9. Stripping cream by hand from bag.

metal receptacle and fills the bag with 1¼ gallons or 10 pounds of cream. The can is 10½ inches high and 6 inches in diameter. A curved metal rim is placed over the top of the can and the top of the bag is folded over it. Cream passes through the strainer into the bag, after which the bag is tied with the poly-strand ties. Lids are provided for the receptacles and the entire container with lid intact may be placed under refrigeration in this manner. If water is used for cooling, it is best if the plastic bag is left in the can. When water is not used, the plastic bag itself can be placed under refrigeration. When ready for shipping, four filled plastic bags are placed into a square corrugated paper box and the box is sealed with tape that is provided. If four filled bags are not available, a partly filled bag can be placed in the box and shipped. This box, when filled, holds the equivalent of a 5 gallon cream can. The weight of the bags and box is 2½ pounds compared to 14 pounds for the average empty 5 gallon metal can.

After the six week period was completed, cooperating patrons, route drivers, and the creamery manager were surveyed to determine their reaction to use of plastic bags as compared with the can method of cream procurement.

Weight, grade, flavor, and acidity were determined from samples taken each time the cream arrived at the plant. The tests for acidity were made according to the method generally used by creameries throughout the state.

CHAPTER II

QUALITY DIFFERENCES OF THE TWO SYSTEMS

The next phase of the procedure was undertaken to compare the quality of cream arriving at the creamery under the two systems of procurement. Testing the cream to determine grade and acidity was carried out in the Dairy Department laboratory at South Dakota State College. The tests were run as soon as possible after the procurement of the sample so as to represent as closely as possible the true quality of cream arriving under each method.

In determining quality differences, the following table was used as a grade scale:

Table I. Cream Grade and Butter Score Values

CREAM GRADE	BUTTER SCORE
38	93 AA
37	92 A
36/35	90 B
34	89 C
Below 34	Below Grade

The butter score used in the table is the same as the federal standards for U. S. creamery butter. Cream grade is a value set up in conjunction with the butter score for this experiment. A grade of 45 is hypothetical and supposedly equals a 100 butter score. In actuality 93 or AA is the highest value ever given butter and thus 38,

which equals sweet cream, is the highest value given cream grade. Cream grade decreases as acidity goes up and flavor defects become present.

The various flavors along with the degree of acidity determines the grade of cream in this study. The grade of cream, in part, determines butter score.

Average temperature conditions, thought to have an influence on the acidity content of cream shipped in plastic bags, had no noticeable effect during the experiment. Cream marketed in plastic bags during the first three week period was subject to higher outside temperatures than cream marketed during the second three week period. The amount of acidity during the first three week period was lower than the acidity in cream shipped during the second three week period. This was because more refrigeration was used during the first three week period.

The two following tables show the average grade and average acidity of cream of each patron over the six week period.

All cream marketed in plastic bags during the experimental period showed a definite improvement in quality over when cans were used. In every single case recorded between bags and cans, grade was improved when bags were used.

Grade improvement in the majority of the cases indicated that when plastic bags were used, cream quality was raised from Grade C to Grade B, and in some cases even up to Grade A. This indicates that if C grade butter is being produced, the sanitary features of plastic bags would definitely help in raising a produce labelled "C"

Table II. Average Grade and Average Acidity of Cream Under Two Systems of Cream Procurement - Route A

Code number	Grade	Acidity	
B	35.67	.34	bags
	34.33	.40	cans
E	35.5	.52	bags
	34.67	.55	cans
F	34.75	.61	bags
	34.0	.66	cans
G	36.33	.40	bags
	34.33	.57	cans
H	35.33	.52	bags
	34.33	.64	cans
J	35.16	.53	bags
	33.83	.68	cans
K	37.0	.29	bags
	34.33	.54	cans
L	34.83	.51	bags
	33.83	.59	cans
M	36.0	.44	bags
	32.0	.63	cans
O	36.67	.40	bags
	35.75	.35	cans
Average	35.72	.46	bags
	34.14	.56	cans

Table III. Average Grade and Average Acidity of Cream Under Two Methods of Cream Procurement - Route B

Code number	Grade	Acidity	
1	35.	.55	bags
	34.67	.72	cans
2	33.5	.59	bags
	33.33	.77	cans
3	35.	.53	bags
	34.5	.59	cans
4	35.83	.41	bags
	34.16	.67	cans
9	34.33	.61	bags
	34.16	.64	cans
10	35.	.53	bags
	34.16	.77	cans
12	37.	.31	bags
	34.16	.75	cans
13	34.33	.52	bags
	34.16	.50	cans
14	35.33	.59	bags
Average	35.04	.52	bags
	34.16	.68	cans

up to Grade B. This does not mean that a B grade product could be raised to A grade butter. This span is greater and the plastic bags in themselves are not enough to insure an "A" grade product being produced.

The following charts show the various cream flavors recorded for each patron on both routes when cans and bags were in operation.

Six patrons on route A had similar results when cans were used. Musty, utensil, and metallic flavors were present in the cream. Of these six, only three had these same flavor defects present when bags were used; flavor defects were not evident as frequently when bags were in operation. The rest of the patrons had various flavor defects as can be seen on the charts. Results show more definite flavor defects were prevalent when cans were used.

On route B, practically all patrons had more flavor defects evident when using bags than did patrons using bags on route A. Flavor defects tended to lower grade. Refrigeration was used to a greater advantage on route A. Flavor defects were present in cans on route B to a greater extent than when bags were used on the same route. Refrigeration, even though used sparsely for bags on route B, was still used to a greater extent than when cans were used.

Average acidity for cream shipped in plastic bags was .49 for the six week period. Average acidity for cream shipped by the same patrons in cans was .62 for the same six week period.

The following bar graphs show the difference in acidity between the bag and can method.

On route A, average acidity decreased .176 when bags were used

Table IV. Flavor Differences Between Methods of Cream Procurement - Route A

Flavor	Patron B		E		F		G		H		J		K		L		M		O	
	bag	can	bag	can	bag	can	bag	can	bag	can	bag	can	bag	can	bag	can	bag	can	bag	can
Metallic						X		X				X		X		X				
Utensil				X	X	X		X	X	X	X	X		X	X	X				
Musty		X		X	X	X		X				X			X	X				
Cheesy						X				X		X					X			
Bitter				X						X										
Weedy		X																		X
Storage																		X		
Feed	X																			X
Unclean																				
Medicinal (foreign)																				
Sweet													X							
Acid	X		X		X														X	X

Table V. Flavor Differences Between Methods of Cream Procurement - Route B

Flavor	Patron 1		2		3		4		9		10		12		13		14	
	bag	can	bag	can	bag	can	bag	can	bag	can	bag	can	bag	can	bag	can	bag	can
Metallic	X	X		X		X		X		X		X		X				
Utensil	X	X		X	X	X		X		X	X	X		X	X		X	
Musty									X		X					X		
Cheesy			X	X				X							X	X		
Bitter		X													X			
Weedy																X		
Storage																		
Feed												X		X				
Unclean		X												X				
Medicinal (foreign)																X		
Sweet														X				
Acid						X		X		X	X		X			X		
Fruit				X														
Rancid			X															

Table VI. Acidity Differences Between Methods of Cream Procurement - Route A

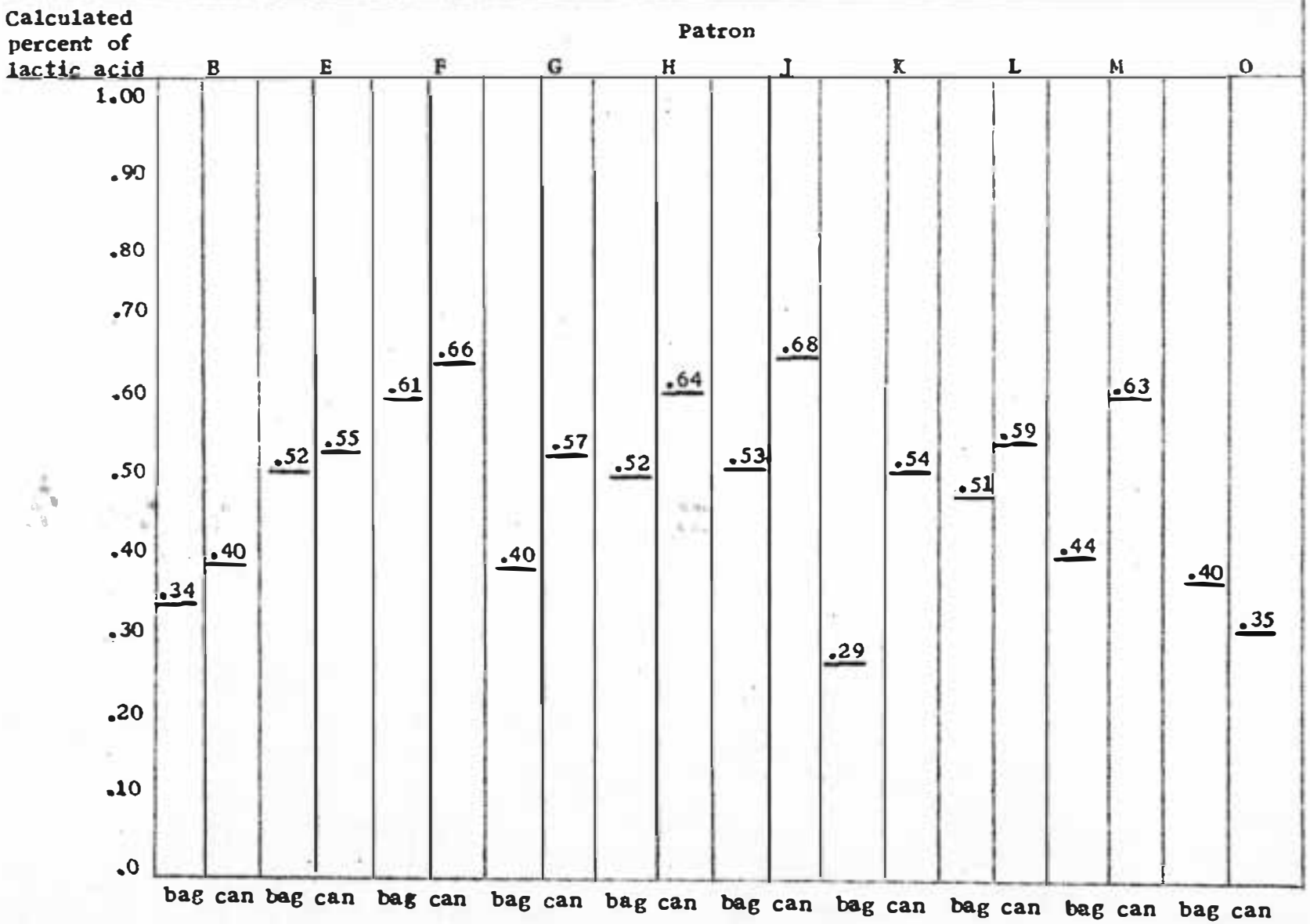
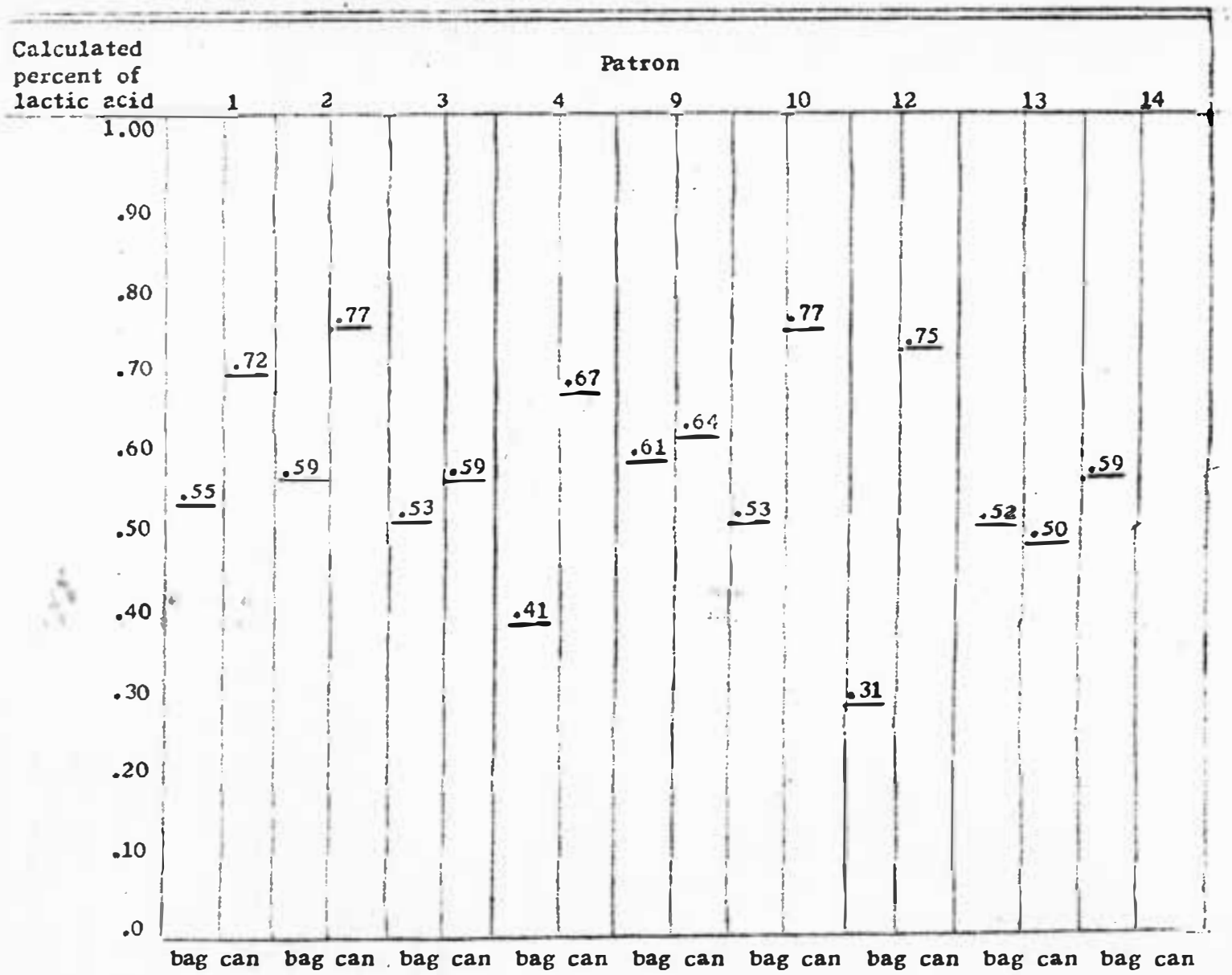


Table VII. Acidity Differences Between Methods of Cream Procurement -- Route B



rather than cans for five patrons. Range ran from .120 to .250. All these patrons used the refrigerator for bag cream and other methods of cooling for cream shipped in cans. Acidity dropped .03, .05, and .08 when bags rather than cans were used for cream procurement for these other patrons. These patrons used water or the cellar for cooling cream under both methods. The remaining patron on this route cooled cream in the refrigerator when cream was shipped either by the bag or can method. Acidity increased from .35 to .40 when bags were in use.

On route B, average acidity dropped .258 when bags rather than cans were used for five patrons. Range was from .170 to .440. All but one of these patrons used the refrigerator for cream shipped in bags. Acidity was very high, .59 for bag cream and .77 for can cream for the one patron who left cream standing on the porch. This reflects that cleanliness and sanitary features of bags cause an acidity decrease. Acidity of cream dropped .03, and .06 when bags rather than cans were used for two patrons. Cream was kept in the basement under both systems of procurement. Cream acidity for another patron went up .02 when bags were used. This cream was kept in the basement while cream in cans was held in the milkhouse. Grade was just over 34 under both methods. The remaining patron on this route did not send cream when samples were being taken from cans. Acidity for bag cream sent by this patron was .59 and grade was 35.33 with a slight utensil flavor being present.

A better quality of cream is obtained when plastic bags are used and kept under good refrigeration. The sanitary features of the bag

resulted in better cream being obtained by the creamery.

CHAPTER III

COST DIFFERENCES OF THE TWO SYSTEMS

The feasibility of plastic bags replacing the cream can in cream procurement will depend on the relative cost of the two methods of cream collection as well as the relative quality. The purpose of this chapter is to compare the cost of the two systems to the creamery and to the patron.

Cost to the Patron

Under the existing method of cream collection in the creamery under study, the cream can is supplied free of direct cost to the patron. However, if the plastic bag method were used, it would probably not be feasible for the creamery to furnish the bags and corrugated boxes. The reason for this is that both the plastic bags and the boxes have many uses around the farm home and if they were furnished free, the creamery would have difficulty limiting the use of the bags and boxes to cream collection.

Plastic bags cost 3½ cents each. The corrugated box costs 14½ cents.[3] If the corrugated box can be used three times, then the cost to the patron of shipping three boxes of cream would be 56½ cents. (There are four bags in each box.) If the bags were full when shipped they would contain approximately 40 pounds of butterfat. The cost to the patron would then be approximately 1½ cents per pound of butterfat.

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[3] From correspondence with Mr. C. F. Peterson, Manager, Galva Creamery, Galva, Illinois, June 15, 1956.

Cost to the Creamery

It is highly unlikely that farmers would switch to the plastic bag method of cream procurement unless they received a premium for the butterfat approximately equal to their increased cost. The question then arises as to whether the creamery makes enough saving in costs using the bag method that it could pay a premium large enough to cover the added expense to the farmer.

A complete cost analysis of the creamery was not made because relatively minor changes in operating procedure would be required to change from can procurement of cream to the bag method. Only the costs directly related to procurement, equipment changes, and receiving room costs of the two methods of handling cream were considered in this study. Any factors, such as labor costs, that would be the same for both methods of cream procurement were not taken into account.

Cost Changes

In evaluating cost changes, truck expense was determined. The same size truck box, which is 7 feet by 13 feet would perhaps be used because of the great amount of eggs picked up each day, but a smaller truck chassis could possibly be used because of reduction in weight. On Mondays and Thursdays average weight was 2975 pounds, on Tuesdays and Fridays average weight was 1952 pounds, and on Wednesdays and Saturdays average weight was 2025 pounds. Of this weight, about 1400 pounds or more was composed of eggs each day. Volume of eggs concerned would make it practical to have the same size truck box even though volume in space for cream would be somewhat reduced by using bags.

The size of the tires used on the one ton truck is 1750 x 800. A smaller size tire, 1600 x 700, was tried, but was not acceptable because of excess weight. If the added weight of the cans were eliminated, perhaps this smaller size tire could be used, thereby cutting operating cost. The following chart shows how truck operation costs were derived:

Table VIII. Truck Operation Costs[4]

	1 ton truck* cans	3/4 ton truck** bags
Gas	$655.00	$575.00
Oil	15.00	10.00
Tires	100.00	75.00
Insurance	70.00	60.00
License	35.00	30.00
Repairs	150.77	70.00
Total	$1025.77	$820.00
Depreciation***	460.00	375.00

* Actual cost of operating a 1 ton truck for 15,000 miles.

** Estimated cost of operating a 3/4 ton truck for 15,000 miles.

*** Based on 5 years.

Depreciation expense varied between methods of cream procurement.

[4] From an interview with James Gomer, Manager, White Creamery, White, South Dakota, July 20, 1956.

Depreciation on a one ton truck which is used for can cream procurement is higher than a truck which can perhaps be used for bag cream procurement. Depreciation was figured on the value of all equipment when new.

Taxes on equipment was determined by using the standard rate in South Dakota of 25 mils on the dollar. The value of the equipment needed for can cream procurement brought taxes up compared to the equipment used for bag cream procurement.

Variable costs under can procurement that are not present when bags are used are for water, coal, soap, and retinning. Stickage loss is an expense charged to plastic bag cream procurement. Electricity is used under both methods to a certain extent although this cost is lower when the bag method is in operation.

Truck operating cost was determined by taking actual costs of operating a one ton truck on the routes for a years time and by estimating costs of operating a three quarter ton truck under the same conditions. Experience in the operation of this smaller vehicle was a factor that helped determine this estimated cost. A break down of how these costs were derived can be found in Table VIII.

Table IX shows the factors that will change under the two methods of cream procurement. A comparison of these costs shows the difference present and how it actually affects a creamery.

Cost Differences

Procurement costs that would change if plastic bags were used amount to $1399.42 for the last fiscal year, assuming 100% patron cooperation. The same factors under the can method of cream procurement

Table IX. Cost Comparisons Under the Two Systems of Cream Procurement

Fixed Costs	Cans*	Bags**
Depreciation on trucks***	$460.00	$375.00
Depreciation on can washer****	40.00	
Depreciation on cans and lids****	200.00	
Depreciation on wringer****		5.00
Depreciation on kits***		78.00
Taxes - cans	50.00	
Taxes - can washer	12.00	
Taxes - wringer		1.25
Variable Costs		
Water	159.51	
Coal	120.00	
Soap	80.00	
Retinning	200.00	
Stickage loss		110.17
Electricity to run can washer	20.00	
Electricity to run wringer		10.00
Truck operating cost	1,025.77	820.00
Total Cost	$2,367.28	$1,399.42

* Actual cost under can cream procurement for the last fiscal year.

** Estimated cost under bag cream procurement.

*** Based on 5 years.

**** Based on 10 years.

cost $2367.28 for the last fiscal year. Difference in operation costs indicate that plastic bag cream procurement would be $967.86 cheaper for a year's time. Cost per pound of butterfat under bag procurement is $.00958 compared to $.01615 per pound of butterfat under can procurement.

Difference in cost between the two methods of cream procurement would have been only $.00656 or about 2/3 of a cent per pound of butterfat. This difference is figured by subtracting cost per pound of butterfat delivered by the can method from cost per pound of butterfat delivered by the bag method. This indicates that plastic bag cream procurement, even though cheaper to the creamery, would not be practical unless a better quality butter could be produced.

The average difference in price paid in 1955 between Grade C butter and Grade B butter was $.01282 per pound on the Chicago market.[5] Thus, if a creamery was selling a Grade C product and the features of the plastic bags would raise this product to B grade butter, the creamery would save $.01602 per pound of butterfat. This is assuming that for every cent saved per pound of butter, one and one-fourth cents is saved per pound of butterfat.

This saving of $.01602 plus the saving of $.00656 (difference in costs between bag and can cream procurement) would result in a total saving of $.02258, or 2¼ cents, which the creamery could pay as an incentive price to the producer for using plastic bags.

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[5] United States Department of Agriculture, Agricultural Marketing Service, Dairy and Poultry Market News Service, Chicago, Illinois.

Other Factors to Consider in Determining Feasibility of Plastic Bag Cream Procurement

100% Patron Cooperation

The assumption in the table was that 100 percent of the cream patrons would ship by plastic bag. If only a percentage shipped by bag, cost would be higher than the figure stated. Creameries would be forced to operate under both methods of procurement.

Time Difference

In terms of time, there was no noticeable difference. The length of time it took the route drivers to complete their run was about the same. In unloading, the process took about the same length of time; due to weight difference, the boxes were easier to handle.

Dumping process was slower when bags were used. This took about one-half hour by can method and approximately forty-five minutes when bags were used. Difference was due to the fact that the creamery was not set up for bag dumping. This would not have been practical to do for the short duration of the experiment. The creamery operator was of the opinion that once a creamery is set up for bag dumping, the process would be faster than when dumping cans.

This time element only takes into account the dumping of cream. When considering washing cans, there is additional time. When bags are used, this process is eliminated while when cans are used, the process is left to complete. Washing cans requires approximately one-half hour so the total time involved under the bag method of cream procurement is faster.

Loss of Butterfat

Loss of cream under both systems was negligible. When the can

method is used, each individual can is steamed, thus there is practically no loss. When bags were in use during the experiment, they were stripped down and wrung out by hand. Butterfat loss was deducted by weighing used bags and comparing this weight with the same number of unused bags. Results showed that about one-half pound of butterfat was lost for every one-hundred pounds of butterfat dumped. The creamery manager did not think this loss sufficient to warrant a complaint against using plastic bags. A wringer was set up in order to determine loss of butterfat when a creamery was set up for plastic bag cream procurement. This experiment showed a loss of about 1/8 of a pound of butterfat for every one-hundred pounds of butterfat dumped. This amounts to approximately $110.17 when 146,884 pounds of butterfat are shipped in a years time.

Partially Filled Bags

During the experiment, a few of the patrons sent in cream in bags that were only partially full. This practice could amount to an added expense if a patron sends in only 35 to 40 pounds of cream in eight to ten bags. If there is not enough cream to fill a bag at time of delivery, one partially filled bag should be sent, even though there is added expense. This is a good practice in order to insure sweet cream reaching the creamery instead of being held over until the next delivery. But if patrons do use too many bags, this will be an expense that could be eliminated by economical use of the plastic bags.

Change in Price of Supplies

In time to come, if plastic bag cream procurement becomes popular throughout the dairy industry, there is a chance that the cost

of supplies for this type of procurement will decrease. If more and more people start using plastic bags, the increased production should result in the product being offered at a lower price to consumers.

Use of Bags After Cream Delivery

An interesting sideline came about during the experiment. Many people wanted used plastic bags. Because of their thickness, bags could be used for storing and freezing perishable products. The creamery found they could sell these used bags for 2 to 3 cents per bag. This meant that the original price of bags could be recovered after use. People were willing to wash and clean bags for their own use, so the creamery was not troubled with this burden.

Value of Morale

The majority of the creamery employees felt that the plastic bags were much easier to handle than the bulky cream cans. They were interested in the experiment and felt that in time to come the bags would prove beneficial due to the reduced amount of weight and volume between the two methods.

Patrons were interested in the experiment and due to their cooperation this study was made possible. The following chapter explains their problems, reactions, and recommendations to the plastic bag method of cream procurement.

CHAPTER IV

REACTION TO, AND PROBLEMS WITH THE PLASTIC BAGS

Upon completion of the experiment, cooperating patrons were surveyed to obtain reactions and comments in using the bag system of cream procurement. The amount of cream marketed in plastic bags per patron varied from 6 to 32 bags per week.

Patron Reaction

Little trouble was expressed by patrons in tying the bags. Only three of the 19 patrons studied expressed trouble with tying, and four patrons recommended using rubber bands for tying rather than plastic ties. All patrons stated that bags were strong enough since no cream was lost due to breakage or puncture.

Fourteen patrons said if the creamery would switch to the plastic bag method of cream procurement, they would cooperate. Two were undecided, one said he would quit milking, and two felt they would look for different outlets. Thus almost 75 percent of those who shipped by bag during the experiment would continue to ship cream in this manner.

Ten patrons felt there was no difference in weight lifting as far as women were concerned. Cream was handled in the same type container under both methods of procurement until delivery. Two patrons said women did not handle their cream and seven felt that the bag method saved on weight lifting because there were no heavy cans to lift.

When asked what was done with the filled plastic bag, two

patrons replied they were put at once in the refrigerator and left until delivery. Four others left the bags in the refrigerator until the next milking and then stored them in the basement. One patron cooled his cream in water, one left the cream on the porch, and the remaining three kept their cream in the basement. When cans were used, three patrons cooled their cream with water, one patron left his cream in the kitchen, one patron used refrigeration, and ten patrons left their cream in the basement. Thirteen patrons felt they used more refrigeration when bags were used, and one thought that very little more refrigeration was used; the remaining five said no more refrigeration was used when bags were in operation. Seventeen farmers cooled their cream directly after separation; this was by refrigerator or water.

Fifteen patrons said there was no noticeable difference in the time it took to separate between methods. Two patrons thought it took a little longer to "set-up" the bags, and one of these two considered this minor. One patron, who was a large producer, was slowed up during separating because he only had one strainer. After he got a second strainer, time in separating was the same between methods. The remaining patron had trouble separating because the receptacle was too tall.

Sixteen patrons were of the opinion that a plastic liner could be used for cream cans and fourteen were interested in using such a liner. They felt the cream would be cleaner and of better quality if such sanitary measures were taken. Of the other patrons, one felt that warm and cold cream would be mixed together to hinder the

improvement of quality. Two of the remaining four patrons felt that because they produced only a small amount of cream, they would not be interested in such a liner. The remaining two patrons were of the opinion that quality would not be improved by using such a liner. Nine patrons were interested in another size bag than the one used in the experiment. Some felt that 5, 10 and 15 pound plastic bags could be made to accommodate different size producers. The remaining patrons felt that bags used in the experiment were the right size and if a bigger one had been used, refrigeration would have been more of a problem. The 10 pound bag could be kept in the refrigerator, was the comment received from a majority of the patrons.

If the creamery supplied the initial kit and all supplies, fourteen patrons said they would send cream by bag. Reasons given for sending cream in this manner were: more sanitary method, to satisfy creamery, better quality cream obtained in this way, and it is easier to ship by bag. Reasons for not shipping cream by bag even if the creamery supplied all material were: large quantity produced, not worth the effort, bags too small, and it is easier with cans. Ten patrons felt that they could not afford to ship cream if they had to supply the kit themselves. The other nine felt that even though they had to buy the kit themselves, they would still ship by this method. Seventeen of the producers felt that the creamery should pay a higher price per pound of butterfat for cream shipped in plastic bags. These producers thought they should receive from 2 cents to 3 cents more per pound of butterfat. Two people said they did not know what a fair increase would be.

Only one patron thought the corrugated boxes used for shipping should be stronger. The rest thought the boxes were strong enough and could be used from two to six times. Handling boxes carefully was a factor that counted heavily. Boxes were subjected to rough treatment because of road conditions. One of the patrons felt that boxes would last "as long as an egg case" and another termed the boxes' duration as indefinite.

In terms of which method was easiest to handle, nine patrons felt that bags were easiest. Reasons for this were given as: always having fresh cream on hand, lighter to handle, no cans to wash, and cans are too greasy and cannot be cleaned. Seven patrons thought cans were easier to handle because: it was simpler, too hard to set up bags, and it was simpler to get cream for own use from can. Three patrons thought there was no difference in handling between the two methods.

Eight of the patrons felt there was enough quality difference to warrant a switch to the bag method; four did not think there was enough difference to switch, one patron did not think there was any difference between the quality of cream shipped in bags compared to that shipped in cans, and six did not have any idea if there was a difference in quality of cream shipped between the two methods.

Nine patrons had no idea if there was enough cost difference to warrant a switch to the bag method. Six patrons felt that cost of shipping cream would be higher if bags were used, and four felt there was no difference in cost between the two methods.

Seven patrons used cream from plastic bags in baking. One

felt there was a difference in the quality of her baking because fresher cream was used. The others could not tell any difference in quality of products baked.

Nine patrons felt that in adverse weather conditions the bags would be easier to handle than cans. Reason for this was because excess weight, due to heavy cans, would be eliminated. Four patrons felt there would be no difference under bad weather conditions; two of these four were small producers where a small amount of cream handled would not make a difference. Four patrons thought there would be no noticeable difference in adverse weather while two patrons were under the impression cans would be easier to handle during bad weather.

Fourteen of the nineteen patrons thought bags would replace cans in the future. Most of these producers did not express how soon the change would come, but several patrons thought the change would be within two to five years.

Comments and suggestions varied. One patron found three or four bags defective (had small leaks) and because of this, did not feel safe in putting bags in the refrigerator. This same patron was under the impression that using bags was a good idea although for the large producer these bags were too small and a five gallon liner was the answer to their problem. Nine patrons were of the opinion that refrigeration was the answer to getting better quality cream. The general impression was that plastic bags could be kept under refrigeration more easily than cream in cans. One patron said butterfat test was up when bags were used and price received for cream was

higher.

Creamery Manager Reaction

The creamery manager thought cream received in plastic bags was of better quality than cream received by can procurement. Reasons for this were: (1) more refrigeration used when bags were employed (2) no metallic flavor gotten from rusty cans and (3) no musty flavor because of cream being kept in cellar.

The creamery manager stated that butter quality would be improved if bags were used but a higher grade could not be obtained unless all patrons used bags and kept cream under good refrigeration. An incentive price of 2 to 3 cents would be paid by the creamery if a sweet cream law were in effect, and bags were used in cream procurement.

The manager felt bags were easier to handle than cans because they needed less space and were lighter. If weather conditions were bad, bags would be much easier to handle due to lightness of load being carried. If the creamery were set up for bag-cream procurement, there would also be no cans to wash and no upkeep to cans. The manager thought that expense incurred in setting up a plastic bag procurement system would be high, but once the system was in operation, would be less expensive than shipping cream by can. The creamery would supply the initial kit to farmers for plastic bag cream procurement.

The manager was of the opinion that a smaller truck could be used in cream procurement if bags were used rather than cans. The reason given for this was reduction in weight.

Patron reaction was generally favorable according to the manager.

Farmers felt if quality improvement was gained, the bag method of cream procurement was acceptable. This was the general feeling as the creamery manager saw it. The manager was under the impression that the other employees of the creamery thought the bags were more sanitary, and in time to come more people would be shipping cream by plastic bag.

Breakage or leakage of cream from plastic bags was no problem at the creamery; bags were very durable under all conditions according to the manager. The ties were adequate; there was no leakage due to poor tying.

The creamery manager felt more people were becoming quality conscious because of bags. When plastic bags were being used, refrigeration was used to a greater extent than when cans were used.

The manager thought a five gallon plastic liner could be used for cream cans. This would result in the elimination of possible contamination from cans not properly sanitized and from cans containing rust spots.

Thus the general impression of the manager was that cream shipped by plastic bag resulted in a higher quality of cream received by the creamery. If complete patron cooperation would be extended, the manager felt that a better grade of butter could be obtained under plastic bag cream procurement.

Truck Driver Reaction

Truck driver reaction was varied. The driver on route A preferred bags to the cans because of (1) ease in handling, (2) more sanitary, (3) less space needed and (4) weight difference made it

cheaper for truck operation. The driver on route B preferred the cans because (1) more practical, and (2) less worry about spillage.

Both drivers said time involved in loading and unloading cream was the same under both methods of cream procurement.

The route A driver felt there was a noticeable weight difference in the two systems. The truck seemed to handle easier because of reduction in weight when bags were used. The route B driver saw no difference between the two methods. The route A driver thought a smaller size truck could be used if bags were used due to weight and volume difference. The route B driver felt that the same size truck would have to be used with either method because space was needed for eggs, although if only cream were being procurred, a smaller truck could be used.

The driver on route A felt that patrons would use plastic bags if they would receive an incentive price. The route B driver thought patrons were glad to go back to cans after the experiment, although a few did not mind bags.

The route A driver felt the bag method was much easier on the driver because of reduction in weight and lifting. Bags should be tested to make sure they are durable, according to this driver, and receptacles should have handles for patron use. The route B driver thought bags were too much bother and not practical in this area. If plastic is the answer to quality improvement, a liner should be made for the can according to this driver. "The small producer can use the bags to an advantage and it would be handier and cheaper for them, though," said the route B driver. This driver felt that bags were more

sanitary than cans and if a stiff grading law came into effect, people would become more quality conscious and take better care of their cream.

CHAPTER V

SUMMARY AND CONCLUSIONS

There is need in South Dakota for quality improvement of cream. Marketing and processing this cream plays a basic part in quality of butter manufactured. The small producer is at a disadvantage in that he does not have the facilities to properly handle his product.

A method has been devised to help the small producer market a better quality cream. This method is shipping cream in plastic bags rather than cream cans. This method was found to be effective in procuring a better quality product if refrigeration was used to the greatest advantage.

Cream was received at the creamery in plastic bags for a period of six weeks from two routes; each route shipped by bag for three weeks and can for three weeks. Samples were taken, grade and acidity were recorded, and quality differences determined.

Cream shipped in plastic bags can easily be placed under refrigeration. If the refrigerant is water, the bag can be left in the metal container which supports it while it is being filled, tied with polyties or rubberbands, and after a lid is placed on the container, the b entire unit can be put into water for cooling. If cream is quickly cooled to retard growth of bacteria, it can be placed in a basement or cave until time of delivery.

Better quality cream is received when bags are used because cream is sealed in and protected from dust, air, foreign odors, and insects. Cream thereby retains a higher quality and is not contaminated

from rusty or battered cans. Insulation effects of corrugated boxes in which bags are shipped help maintain low, even temperatures for cream. The experiment showed a reduction of old, stale, foamy, yeasty or metallic cream when bags are used.

Cost differences were determined between methods of cream procurement. There is a definite weight reduction. Eighty pounds of cream shipped by plastic bag takes up the space that 40 pounds of cream takes by the can method. Thus a smaller truck with less overhead can be used in shipping cream.

The bag method has eliminated many operations that were standard when cans were used. Weighing of cans, steaming and washing are factors contributing to high overhead costs of a creamery. By using bags, investment in equipment, supplies, maintenance, and plant operation is reduced for the creamery. This reduction is due to elimination of the mechanical can washer, along with coal costs for steam. As a result steam and water are conserved. Investment in cans and cost of retinning cans is eliminated.

Upon delivery when bags are in use, cream is weighed and dumped into a vat. Tare weight is the same for all boxes, which greatly simplifies weighing. After dumping, cream is stirred, a sample taken, then transferred into the main vat unless rejected. There is virtually no rejection with bag cream. Loss of cream in bags is negligible. This process is much more simple than using bulky cream cans.

Tare weight is different with each individual can; thus, the scale has to be constantly changed. Cans have to be steamed. In cold weather, lids, and even cans, have to be scraped for clinging

cream. If cans are very dirty, they are scrubbed. This occupies labor time that might be devoted to other uses.

These factors were all taken into consideration in order to determine if shipping cream was feasible by the plastic bag method. The following conclusions were made:

1. The manager felt that the creamery could have two vats of cream for churning, one sweet and one sour, assuming that 50 percent of his patrons would ship by the bag method. A better grade of butter could be made, assuming that cream shipped in plastic bags was refrigerated and kept under sanitary conditions.
2. A better quality of cream was received when plastic bags were used in cream procurement. The bag method was more sanitary and cream was kept under better refrigeration conditions.
3. There are some creameries in the state that produce "C" or undergrade butter. Results obtained from this experiment indicate that the sanitary features of plastic bags would raise this undergrade product to "B" grade butter. This B grade product could be sold at a higher price, which would result in the creamery being able to pay the producer an incentive price for using plastic bags.
4. Patrons were more quality conscious when bags were used. This resulted in better quality cream being received by the creamery, which in turn could result in a better grade of butter being made if enough patrons would comply.
5. There was a cost difference in the two systems. Overhead of the creamery would be cut down if plastic bags were used

for cream procurement.

6. Cost savings to the creamery were not sufficient to pay producers the necessary premiums to cover the added costs of shipping by plastic bags. The feasibility, therefore, of the new system rests squarely on quality improvement.

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Feder, Ernest and S. W. Williams, Dairy Marketing in The Northern Great Plains, Its Patterns and Prospects, North Central Regional Publication Number 47, 1954.

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Letters

Peterson, C. F., Manager, Galva Creamery, Galva, Illinois, Letter to Author, June 15, 1956.

APPENDIX A

Cost of Additional Supplies for Plastic Bag Cream Procurement

Tape 2 inches - plain - $.90 roll - 600 feet.

Tape 2½ inches - reinforced - $1.40 roll - 300 feet.

Plastic ties - 8 inches - $3.07M.

Plain box - 4 bag - $.145 each.

Plain box - 2 bag - $.112 each.

Bags	Quantity	Cost
	5M	$35.99M
	2½M	39.25M
	1M	41.50M
	½M	44.86M
	Less ½M	47.53M

Plain Boxes

4 bag

1M	$127.40M
½M	135.00M
100-500	140.00M
Less 100	145.00M

2 bag

1M	93.80M
½M	102.00M
100-500	107.00M
Less 100	112.00M

APPENDIX B

An Ideal Set-Up for Bag Cream in a Creamery

A dial scale for weighing boxes of cream.

A tilted stand which holds four boxes of cream. (Boxes are opened on this stand, and because of the tilted position, the bags won't fall over or spill after ties are removed.)

A 20 gallon steam-jacketed kettle with 1½ inch opening in its concave bottom.

An electric bag wringer located above the kettle to wring out the surplus cream. Guides can be attached so empty bags will drop into a metal can.

A 1½ inch sanitary centrifugal pump to drain cream from the kettle into the pump and circulate it back into the kettle. (Eliminates hand stirring of cream and results in more accurate tests because cream is more thoroughly mixed after circulation.) This same pump delivers the cream to the holding vat by means of a 2-way sanitary valve.

Sanitary pipe and fittings, plus a 2-way valve.

Conveyers for box-cream.

APPENDIX C

Patron Questionnaire

SCHEDULE

(Confidential)

1. Name_____

   Address_____

   Amount of bags used each time_____

2. Did you experience any trouble in tying the bags?_____

   What did you use, other than the regular tie, to tie the bags?

   _____ Have you any recommendation on the use of a

   different type of tie?_____ Yes _____ No. If so, what?

   _____

3. Are the bags strong enough to hold your cream?_____ Yes _____ No.

   Did you lose any cream due to breakage of the bags, or puncture

   tears? _____ Yes _____ No. How much?_____ If so, is there

   any way that you know of to reduce this loss? _____

   _____

4. If the creamery did switch to the bag method would you go along,

   or would you look for a different outlet? _____

5. From a woman's point of view, is the added time worth it in terms

   of saving on weight-lifting, etc? _____ Yes _____ No.

6. What did you do with the filled plastic bag? _____

   Describe refrigeration technique _____

   How does this compare with what you did previously? _____

   _____

7. Did you use any more refrigeration than you used with the cans?

   _____ Yes _____ No. Did you use refrigeration at once? _____ Yes

_____ No. If not, how soon was the cream refrigerated? _____ What temperature was the cream placed at? _____

8. In your opinion was your cream in better condition than when you used cans? _____ Yes _____ No. If so, why the difference? _____ _____ If not, why not? _____

9. Would you consent or consider getting an old refrigerator to use for cooling, if the bag system were put into operation? _____ _____

10. What other methods of cooling do you think you would use if the plastic bags were used? _____ water _____ basement _____ well-casing.

11. Did you notice any difference in the time it took to separate between the bag and can method? _____ Yes _____ No. Which method took longer? _____ Why? _____

12. Do you think a 5 gallon plastic liner for your cream could be used? _____ Yes _____ No. Would you be interested in using such a liner? _____ Yes _____ No. Do you think a different size bag could be used rather than the 10 lb. one? _____ If the bag were bigger, could you cool it? _____ How? _____

13. Would you be willing to ship cream in bags rather than cans if the creamery supplied the initial kits? _____ Yes _____ No. Why? _____ _____ Would you ship by bag if you had to pay for it? _____ Yes _____ No.

14. Do you think you should receive a higher price per lb. if you ship in plastic bags? _____ If so, how much increase do you think would be fair? _____

15. Is there any method that would be better in the shipping of cream, or are the corrugated boxes adequate? _____ Do they stand up okay? _____ How many times do you think each box can be used? _____

16. Which method, bag or can, is the easiest for you to handle? _____ Why? _____

17. Do you think there is enough quality difference to warrant a switch to the bag method? _____

18. Do you think there is enough cost difference to warrant a switch to the bag method? _____

19. Have you noticed any difference in your truckers reaction toward using the bags rather than the cans? _____

20. What do other farmers think of these bags? _____

21. Have you used cream from the plastic bag in your baking? ____ Yes ____ No. If so, is there an improvement in your baking quality? ____ Yes ____ No. If so, why? _____

22. Do you think that in adverse weather conditions, bags will be easier to handle than cans? _____

23. Do you think that in time to come, bags will replace cans? _____ Yes _____ No No opinion_____. If so, how soon? _____

24. Comments - Suggestions

25. Date _____

Name _____

Creamery Manager Questionnaire

SCHEDULE

(Confidential)

1. Is there a difference in the quality of cream received by bag rather than can? _____ Yes _____ No

2. If so, give reasons that you feel justify this difference.

   1. _____

   2. _____

   3. _____

3. Will the quality of your butter go up if bags rather than cans are used? _____ Yes _____ No

4. Will it make a difference in the grade of butter that you produce? _____ Yes _____ No

5. Would you be in favor of a "sweet cream law" in South Dakota? _____ Yes _____ No Why? _____

6. If bags were used, would you pay an incentive price to receive the better quality cream? _____ Yes _____ No

7. If so, how much of an increase would you be willing to pay?

8. If bags prove feasible, would you be willing to provide the initial kit to any farmer that doesn't have them? _____ Yes _____ No

9. Would you supply the additional plastic bags to the farmers? _____ Yes _____ No. Why? _____

10. Which is the easiest method to handle, can or bag? _____ Why? _____

11. If your creamery were set up to handle bag cream, do you feel that

then the extra duties would be made easier and thus be justified?

_____ Yes _____ No Why? _____

12. Which method is the fastest as far as loading and unloading operations are concerned? _____

13. In terms of cost, which method results in more cost as far as the creamery is concerned? _____

14. How much do you pay for oil each year in operating your truck? ____

Gas? _____ Tires? _____ Insurance? _____ License? _____

Depreciation? _____ Insulated body? _____ Repairs? _____

Miscellaneous? _____

15. If bags were used, could you use a smaller truck? ____Yes _____ No

16. What is the average weight of your total load on Monday? _____

Tuesday? _____ Wednesday? _____ Thursday _____

Friday? _____ Saturday? _____

17. What is the average volume of this load for each day? ____ Monday

____ Tuesday ____ Wednesday ____ Thursday ____ Friday ____ Saturday

18. How long does it take to unload and dump the can cream? _____

19. How long does it take to unload and dump the bag cream? _____

20. If there is a difference, how do you account for it? _____

21. Is there a difference in the loading process between the two methods? _____

22. If so, why the difference? _____

23. What is the cost of the new cans? ____ 5 gal. ____ 8 gal. ____ 10 gal.

What is the cost of the lids? _____ What is the cost of retinning the cans? _____ How often does this retinning have to be done?

_____ How many times can cans be

retinned? _____ How much depreciation is there on a can in a years time? _____

24. How much fat loss is there by the can method? _____

25. How much fat loss is there by the bag method? _____

26. What does it cost the creamery for steam and water for a years time? _____ to run the mechanical washer? _____ for shipping tags and wires? _____

27. What is your patrons feeling toward the bags? _____

28. What is your driver's reaction toward the bags as far as his operations are concerned? _____

29. What is your feeling toward the bag method? _____

30. What is the volume and weight of a 5 gallon can? _____ 8 gal. can? _____ 10 gal. can? _____

31. How does this compare with a 40 lb. box of bag cream? _____

32. Are your patrons becoming more quality conscious than they have been in the past? ____ Yes ____ No. Is there more refrigeration when the bags are used? _____

33. Has breakage or leakage been a problem here at the creamery? _____ Yes _____ No

34. Do the plastic bags seem to stand up under all conditions? _____

35. Is the tie adequate, or is there leakage there? _____

36. Do you feel, in time to come, that bags will completely take the place of cans? _____ If so, how soon? _____

37. Do you think a 5 gallon plastic liner for the cream could be used? _____ Yes _____ No. Would you like to see such a liner in use? _____ Yes _____ No. Do you think a different size bag could be

used? ____ Yes ____ No. If so, do you think it would be under refrigeration? _____

38. In adverse weather conditions, do you think the bags would be easier to use? ____ Yes ____ No. Why? _____

39. Comments - Suggestions

40. Date _____

Name of Interviewer _____

Truck Driver Questionnaire

SCHEDULE

(Confidential)

1. Which method of handling cream do you prefer, bag or can? _____

   Why? _____

2. How long does it take to load, drive, and unload your route when cans are used? _____ When bags are used?

   _____

3. Which is the most convenient to handle as far as you're concerned?

   _____

4. In your opinion is the weight difference of the two systems noticeable? _____

5. Do you experience trouble with "leakers" or poorly tied bags? ___ Yes ___ No. Have you lost any cream because of this? ___ Yes ___ No. If so, how much? _____

6. What is your patron's reaction toward the bags? _____

7. In adverse weather conditions, do you think that bags would be easier to handle than cans? _____ Yes _____ No. Why? _____

   _____

8. Could a smaller size truck be used to cut down operating expense if bags were used? _____ Yes _____ No. Why? _____

9. What is your own opinion of the bag method? _____

   _____

   Why do you feel this way? _____

   _____

10. What is the difference in the cream loss when dumping between the two methods? _____

Do you think you could cover your route faster with the bag method?

____ Yes ____ No. Why? _____

11. Comments - Suggestions

12. Date _____

Name of Interviewer _____

APPENDIX D

Cream in Plastic Bags

First Three Weeks of Experiment

Date	Code	Grade	Flavor	Wt.	Acidity
6-11-56	B	35	----	100	.32
6-14-56	B	35	----	90	.32
6-18-56	B	36	----	99	.32
6-21-56	B	36	----	34	.33
6-25-56	B	36	----	102	.38
6-28-56	B	36	Sl. Feed	100	.37
Average		35.67			.34
6-11-56	E	35	----	27	.50
6-14-56	E	35	----	28	.59
6-18-56	E	35	----	28	.48
6-21-56	E	36	----	25	.52
6-25-56	E	36	----	90	.56
6-28-56	E	36	----	23	.51
Average		35.5			.52
6-11-56	F	35	----	74	.56
6-14-56	F	35	----	52	.63
6-18-56	F	35	Sl. Uten.	75	.60
6-21-56	F	34	Musty	49	.66
6-25-56	F				
6-28-56	F	—			—
Average		34.75			.61
6-11-56	G	36	----	75	.50
6-14-56	G	36	----	68	.40
6-18-56	G	36	----	69	.32
6-21-56	G	37	----	58	.34
6-25-56	G	37	----	72	.48
6-28-56	G	36	----	68	.32
Average		36.33			.40

Date	Code	Grade	Flavor	Wt.	Acidity
6-11-56	H	36	----	35	.50
6-14-56	H	35	Sl. Utensil	28	.52
6-18-56	H	34	Def. Utensil	31	.40
6-21-56	H	35	Sl. Utensil	27	.57
6-25-56	H	36	----	37	.57
6-28-56	H	36	----	35	.57
Average		35.33			.52
6-11-56	J	35	Sl. Utensil	78	.52
6-14-56	J	36	----	56	.56
6-18-56	J	35	Sl. Utensil	85	.52
6-21-56	J	35	----	65	.58
6-25-56	J	35	Sl. Utensil	76	.52
6-28-56	J	35	Sl. Utensil	57	.49
Average		35.16			.53
6-11-56	K	37	Sweet	30	.19
6-14-56	K	37	Sweet	22	.23
6-18-56	K	37	Sweet	30	.23
6-21-56	K	37	----	20	.45
6-25-56	K	37	----	23	.38
6-28-56	K	32	----	16	.27
Average		37.0			.29
6-11-56	L	35	Sl. Utensil	87	.57
6-14-56	L	35	----	48	.48
6-18-56	L	35	Sl. Utensil	69	.28
6-21-56	L	35	Sl. Utensil	49	.57
6-25-56	L	34	Musty	68	.61
6-28-56	L	35	Sl. Utensil	45	.52
Average		34.83			.51

Date	Code	Grade	Flavor	Wt.	Acidity
6-11-56	M	35	Storage	11	.42
6-14-56	M				
6-18-56	M	36	----	7	.49
6-21-56	M				
6-25-56	M	37	----	6	.42
6-28-56	M	—			—
Average		36.0			.44
6-11-56	O	36	----	39	.50
6-14-56	O	37	----	38	.48
6-18-56	O	37	----	38	.30
6-21-56	O	37	----	36	.37
6-25-56	O	37	----	35	.38
6-28-56	O	36	----	38	.40
Average		36.67			.40

Cream in Cans

First Three Weeks of Experiment

Date	Code	Grade	Flavor	Wt.	Acidity
6-11-56	1	34	Sl. Met.	51	.70
6-14-56	1	35	Sl. Uten.	40	.72
6-18-56	1	35	Sl. Uten.	52	.70
6-21-56	1	35	Sl. Uten.	46	.78
6-25-56	1	35	Sl. Uten.	61	.73
6-28-56	1	34	Bitter, Unclean	59	.70
Average		34.67			.72
6-11-56	2	34	Def. Utensil	44	.74
6-14-56	2	33	Fruity	35	.75
6-18-56	2	34	Sl. Met.	54	.79
6-21-56	2	34	Def. Utensil	46	.78
6-25.56	2	33	Cheesy	44	.75
6-28-56	2	32	Cheesy	47	.79
Average		33.33			.77
6-11-56	3	35	Hi Acid	79	.65
6-14-56	3	34	Sl. Met.	54	.58
6-18-56	3	34	Def. Uten.	73	.52
6-21-56	3	35	Sl. Uten.	77	.54
6-25-56	3	35	Sl. Uten.	111	.69
6-28-56	3	34	Def. Uten.	77	.53
Average		34.5			.59
6-11-56	4	35	Hi Acid	30	.63
6-14-56	4	35	Sl. Uten.	23	.68
6-18-56	4	36	Hi Acid	31	.80
6-21-56	4	33	Def. Met., Cheesy	32	.62
6-25-56	4	33	Metallic	55	.67
6-28-56	4	33	Cheesy	29	.59
Average		34.16			.67

Date	Code	Grade	Flavor	Wt.	Acidity
6-11-56	5	35	Hi Acid	61	.64
6-14-56	5	35	Hi Acid	50	.63
6-18-56	5	35	Hi Acid	57	.72
6-21-56	5	35	Sl. Uten.	42	.64
6-25-56	5	35	Sl. Uten.	48	.62
6-28-56	5	34	---	42	.60
Average		34.83			.64
6-11-56	9	34	Def. Uten.	68	.60
6-14-56	9	35	Sl. Uten.	54	.60
6-18-56	9	34	Def. Uten.	69	.73
6-21-56	9	34	Sl. Met.	45	.65
6-25-56	9	34	Def. Met.	64	.64
6-28-56	9	34	Def. Uten.	50	.64
Average		34.16			.64
6-11-56	10	34	Def. Uten.	81	.68
6-14-56	10	35	Hi Acid	81	.68
6-18-56	10	34	Def. Uten.	81	1.13
6-21-56	10	34	Sl. Met.	80	.73
6-25-56	10	33	Metallic	82	.70
6-28-56	10	35	Feed	82	.68
Average		34.16			.77
6-11-56	12	35	Sl. Uten.	39	.82
6-14-56	12	34	Def. Uten.	48	.87
6-18-56	12	34	Def. Uten.	62	.83
6-21-56	12	34	Unclean	42	.64
6-25-56	12	34	Sl. Met.	55	.69
6-28-56	12	34	Def. Uten.	57	.65
Average		34.16			.75

Date	Code	Grade	Flavor	Wt.	Acidity
6-11-56	13	33	For. (Medicinal)	32	.30
6-14-56	13	36	----	24	.47
6-18-56	13	35	----	36	.40
6-21-56	13	34	Foreign (Weeds)	26	.58
6-25-56	13	34	Musty	46	.65
6-28-56	13	33	Cheesy	40	.62
Average		34.16			.50

Cream in Bags

Second Three Weeks of Experiment

Date	Code	Grade	Flavor	Wt.	Acidity
7-2-56	1	35	Sl. Uten.	71	.61
7-5-56	1	35	Sl. Uten.	56	.49
7-9-56	1	34	Sl. Met.	87	.69
7-12-56	1	36	----	65	.46
7-16-56	1	35	Sl. Uten.	88	.58
7-19-56	1	35	Sl. Uten.	66	.47
Average		35			.55
7-2-56	2	36	----	61	.68
7-5-56	2	34	Cheesy	36	.67
7-9-56	2	32	Rancid	41	.71
7-12-56	2	33	Rancid	32	.47
7-16-56	2	33	Rancid	28	.53
7-19-56	2	33	Rancid	18	.48
Average		33.5			.59
7-2-56	3	35	Sl. Uten.	102	.54
7-5-56	3	36	Sl. Acid.	80	.47
7-9-56	3	35	Sl. Uten.	87	.54
7-12-56	3	34	Def. Uten.	65	.56
7-16-56	3	--	----	--	---
7-19-56	3	--	----	--	---
Average		35			.53
7-2-56	4	36	----	34	.41
7-5-56	4	36	----	27	.38
7-9-56	4	35	Sl. Uten.	35	.42
7-12-56	4	36	Sl. Uten.	23	.40
7-16-56	4	36	----	34	.42
7-19-56	4	36	----	28	.41
Average		35.83			.41

Date	Code	Grade	Flavor	Wt.	Acidity
7-2-56	9	35	Sl. Uten.	54	.61
7-5-56	9	34	Uten.	40	.60
7-9-56	9	35	----	42	.60
7-12-56	9	34	Musty	38	.61
7-16-56	9	34	Def. Uten.	43	.64
7-19-56	9	34	Def. Uten.	36	.58
Average		34.33			.61
7-2-56	10	35	Sl. Uten.	96	.54
7-5-56	10	35	Sl. Musty	65	.51
7-9-56	10	35	Sl. Uten.	83	.54
7-12-56	10	35	Sl. Uten.	63	.52
7-16-56	10	35	Sl. Uten.	92	.56
7-19-56	10	35	Sl. Uten.	68	.51
Average		35			.53
7-2-56	12	37	Sl. Feed	63	.38
7-5-56	12	37	Sweet	45	.28
7-9-56	12	37	Sweet	60	.33
7-12-56	12	37	Sweet	36	.35
7-16-56	12	37	Sweet	58	.27
7-19-56	12	37	Sweet	37	.25
Average		37			.31
7-2-56	13	34	Sl. Cheesy	37	.56
7-5-56	13	34	Bitter, Sl. Cheesy	37	.51
7-9-56	13	34	Cheesy	34	.52
7-12-56	13	34	Cheesy	34	.53
7-16-56	13	35	Sl. Uten.	32	.52
7-19-56	13	35	----	32	.48
Average		34.33			.52

Date	Code	Grade	Flavor	Wt.	Acidity
7-2-56	14	35	Acid	19	.60
7-5-56	14	---	---	--	---
7-9-56	14	35	Sl. Uten.	10	.59
7-12-56	14	--	--	--	---
7-16-56	14	36	---	10	.57
7-19-56	14	--	---	--	---
Average		35.33			.59

Cream in Cans

Second Three Weeks of Experiment

Date	Code	Grade	Flavor	Wt.	Acidity
7-2-56	B	35	Weeds	110	.47
7-5-56	B	34	Musty	77	.40
7-9-56	B	34	Weeds	99	.45
7-12-56	B	34	Weeds	72	.44
7-16-56	B	34	Weeds	96	.20
7-19-56	B	35	Weeds	75	.42
Average		34.33			.40
7-2-56	E	35	—	31	.57
7-5-56	E	35	Bitter	23	.58
7-9-56	E	34	Def. Uten.	26	.54
7-12-56	E	35	—	21	.55
7-16-56	E	34	Musty	28	.54
7-19-56	E	35	Sl. Uten.	22	.52
Average		34.67			.55
7-2-56	F	—	—	—	—
7-5-56	F	34	Musty	51	.66
7-9-56	F	34	Cheesy	68	.67
7-12-56	F	34	Def. Uten.	74	.65
7-16-56	F	34	Def. Uten.	81	.67
7-19-56	F	34	Sl. Met., Cheesy	79	.66
Average		34			.66
7-2-56	G	34	Def. Uten.	63	.64
7-5-56	G	35	Sl. Uten.	60	.61
7-9-56	G	34	Def. Uten.	71	.59
7-12-56	G	34	Musty	52	.54
7-16-56	G	33	Metallic	63	.69
7-19-56	G	36	—	54	.35
Average		34.33			.57

Date	Code	Grade	Flavor	Wt.	Acidity
7-2-56	H	34	Sl. Cheesy	40	.71
7-5-56	H	34	Cheesy	37	.66
7-9-56	H	34	Def. Uten.	29	.62
7-12-56	H	35	Bitter	26	.55
7-16-56	H	34	Def. Uten.	29	.68
7-19-56	H	35	Sl. Uten.	23	.63
Average		34.33			.64
7-2-56	J	34	Sl. Cheesy	84	.75
7-5-56	J	34	Uten., Musty	54	.62
7-9-56	J	34	Sl. Mot.	69	.70
7-12-56	J	34	Cheesy	60	.66
7-16-56	J	34	Def. Uten.	61	.67
7-19-56	J	33	Cheesy	59	.66
Average		33.83			.68
7-2-56	K	35	Sl. Uten.	25	.61
7-5-56	K	34	Def. Uten.	19	.58
7-9-56	K	34	Def. Uten.	22	.58
7-12-56	K	34	Sl. Mot.	19	.52
7-16-56	K	34	Def. Uten.	19	.52
7-19-56	K	35	——	15	.43
Average		34.33			.54
7-2-56	L	34	Def. Uten.	63	.61
7-5-56	L	34	Def. Uten.	51	.65
7-9-56	L	34	Def. Uten.	63	.63
7-12-56	L	33	Metallic	48	.55
7-16-56	L	34	Musty	58	.56
7-19-56	L	34	Musty	48	.56
Average		33.83			.59

Date	Code	Grade	Flavor	Wt.	Acidity
7-2-56	M	--	----	--	---
7-5-56	M	--	----	--	---
7-9-56	M	32	Cheesy	10	.69
7-12-56	M	--	----	--	---
7-16-56	M	32	Cheesy	7	.58
7-19-56	M	--	---	--	---
Average		32			.63
7-2-56	0	--	----	--	---
7-5-56	0	--	----	--	---
7-9-56	0	36	Feed	40	.48
7-12-56	0	36	Sl. Acid	39	.46
7-16-56	0	35	Sl. Weedy	36	.26
7-19-56	0	36	Feed	24	.22
Average		35.75			.35