ADULTERATIONS OF MILK.

Various Tests and Formulas Given For Their Detection.

A Valuable Paper on an Important Subject by Professor Lind in of the Agricultural College.

To the Editor:

An editorial under the heading, "Testing Adulterated Milk," in the EVENING NEWS of Saturday, the 19th, is the immediate cause of this article. I thought that perhaps a few notes on the best methods of detecting milk adulteration might be of interest, and perhaps of practical value to some of your readers.

Human nature seems to be the same the world over. The greed for gain, the desire to become rich, the ambition to get the large possible return for the least possible outlay, seems to be everywhere present. The adulteration of many kinds of manufactured products is all too common, but it is the adulteration of our food products that is of most importance to us, as it not only affects the pocket but may also assail the health. These matters should be subjects for legislative action, not only in the different states, but by the National government. The petty thief who robs the consumer of his goods by selling him an adulterated article for the genuine, should be treated the same as any other thief, so that society may be protected from his depredations.

The adulteration of milk is unfortunately too common, not only in our cities, but also in those districts where milk is sold to butter and cheese factories. The practice of adulteration is by no means of recent origin, though the means of detecting it are. The most common methods of milk adulteration is either skimming (removing some of the cream) or watering. Other forms, except perhaps the use of preservatives, are so rare, that but little notice need be taken of them.

The detection of these adulterations belongs largely to the field of the chemist, though it does not require much chemical knowledge to test milk. In case there is suspicion of disease germs being in the milk, a biological examination may be necessary. But as the issues generally arises from the milk being delivered from a home where the disease is present, or (particularly in the case of typhoid fever) in the use of impure water to wash or rinse the milk cans or perchance to adulterate the milk, a thorough inspection will generally clear those evils and render a biological examination unnecessary except in rare cases.

Those who would like to be thoroughly sure on these points have the remedy in their own hands, if they will take the trouble to pasteurize their milk. Any home possesses the necessary apparatus for the work. Take an ordinary Mason jar, or a milk bottle, (size will depend on the amount of milk to be treated) wash thoroughly, scald, fill with milk, and put in the cover; take a tin pail, (5 or 10 quart size) perforate the bottom of a pie plate and place it bottom up in the pail and stand the bottle of milk on top. Fill the pail with warm water up to the level of the neck of the jar or bottle, put the whole on the stove and heat the water to 165 degrees F. Hold at this temperature for half an hour, when the jar of milk should be removed and cooled quickly. Those who have a thermometer may bring the water just to a boil, then remove from the stove immediately (delay will give a cooked taste) and keep the milk in the water for half an hour, then cool and keep cool. This treatment will kill or so retard all disease germs as to render them harmless, particularly if the milk is afterward kept on ice. This treatment also increases the keeping qualities of the milk, by twenty-one to forty-eight hours, and makes it a much safer food for infants at all seasons of the year. The Year Book of the department of Agriculture at Washington D. C. describes this matter thoroughly and probably may be had on application.

The detection of adulteration as at present practiced, is like many other things, the result of a process of evolution. Time or four instruments were formerly used. The lactometer, gave the relative weight of the milk. Milk is heavier than water, and so the addition of water made the milk relatively lighter. But cream had the same effect and skimmed milk is heavier than whole milk. Thus the lactometer alone would not do and other tests were used as checks. The lactoscope, a German invention, is a glass tube, and aims to give the approximate per cent of fat in the milk. A definite quantity of milk is mixed with water in the tube till the black marks on a white column in the base of the tube are distinctly visible. The more water it is necessary to add, the richer the milk is in fat. The possibility of a black dot with a glass cover. The latter is transparent in the centre, but the outside is divided into five or six parts, by different colors radiating from the center, ranging from a creamy white to a light blue. A drop of milk is placed in the centre of the black dot and the glass cover put on. The milk can then be compared to the color which best describes it from cream to poor skim milk. The cream gauge is simply a glass cylinder, which is filled with milk, and allows it to stand twelve to twenty-four hours, and the amount of cream which rises is supposed to tell the richness of the milk. These tests, it can be seen, are at best checks, one on the other and were a great help towards an approximately correct guess as to the quality of the milk. Other tests have been introduced but have not been used to the extent of those described. At the present time all of these tests are practically discarded, though we keep them as relics, of what led five years ago, were the only cheap and simple test of adulteration.

The process upon which the present method, for the detection of adulteration is based are the same as formerly, but the means of obtaining our data and the method of using the same, are much more accurate. Skimming milk reduces the fat, and increases slightly the percentage of other solids of the milk. Watering milk decreases the percentage of fat and of other solids in direct proportion to the amount of water added. The apparatus used is the Babcock milk test, the Quevenne lactometer and a thermometer. With the Babcock we can determine accurately the percentage of fat in the milk. The Quevenne lactometer when immersed in the milk sinks into the column of milk displaced equals its own weight. The reading on the neck gives the excess of weight of the milk over the same volume of water. With these facts as basis, we apply the following formula.

$$\frac{L - .4 F}{3.5} = \text{Solids not fat in the Milk.}$$

L = Quevenne lactometer reading at 60° F.

F = The per cent of fat in the milk.

To illustrate: The lactometer reading is 33 and the per cent of fat is 3.5. Then

$$\frac{33 + (.4 \times 3.5)}{3.5} = \frac{34.40}{3.5} = 9.8$$

9.8 per cent solids not fat in sample.

In testing for adulterated milk it is best for the inspector to get a sample direct from the farm where the milk is produced. As the total solids in a sample of milk from a herd will rarely vary more than three tenths of one per cent from day to day, a sam. le from the home or the dairy, and the sample from the delivery can, should practically agree. If such a sample cannot be procured, also per cent solids not fat taken as a basis of calculations, as milk from a herd very seldom goes be ow six per cent solids not fat or above to per cent, the average being very close to nine. Then if we had a sample of milk which from our tests and calculations gave us only 5.97 per cent solids not fat, and 2.7 per cent fat, it is evident a sample of watered milk, not skimmed milk, (as a sample of this description was recently claimed in one of the Salt Lake papers) except perhaps in a slight degree. To find the amount of adulteration the question is, if 5.97 per cent is the amount of solids not fat in pure milk, how much pure milk is there in a sample containing 5.8 per cent solids not fat. A question in proportion: 9.0 : 100 :: 5.8 : 64.4 per cent or pure milk water, and therefore from 35.6 per cent, the amount of water added. If however we had a sample testing 2 per cent fat and 5.8 per cent solids not fat, we know that such a relation never exists in pure milk and that it is partly skimmed milk.

By the method the students in our dairy laboratory collected about 4 per cent, they miss go close r, of the amount of water with which I dilute a sample, if they have the original to compare it with, whether that original be a sample of whole milk partly skimmed, or skimmed milk. If no original sample cannot be obtained, it can be seen that much milk may be diluted to a slight extent without it being detected. But human nature is such that sooner or later, those men who practice it get too bold and are on every occasion, and when a vigilant inspection is kept up such parties seldom escape.

With regard to other adulterations: Other fats or oils are never added to milk, as it is impossible to emulsify them with the milk. Preservatives are not universally used. Borax and salicylic acid, or a mixture of these, are the most common. Their action is antiseptic, delaying the action of organisms. In small quantities they may be harmless, but as they seem to accumulate in the system and have very little harm, particularly to children, they should not be used. Several states and some of the European countries have laws against the use in any dairy products. I think these preservatives are seldom used as an excuse to adding water or to cover up such dilution. Any ordinary salesman of milk which does not thicken twenty four hours, in the summer time, if kept at the temperature of the living room, I would suspect of being a preserved sample, and it should be sent to a chemist for analysis. Even the adding of burnt sugar or even coloring, both of which are practiced to improve the appearance of the milk, would not escape the detection of an expert, more particularly as only poor milk needs such treatment. Good milk requires no such propping up.

To those who would like to study this subject, I would refer them to the Eighth Annual Report of the Wisconsin Experiment Station, page 99; also the 9 th and 10th Reports, and bulletin no 36. Some of them, perhaps all, may be obtained for the asking. The Dairy Messenger No. 2 contains a very full description of milk testing. Volumes Nos one to ten may be obtained from Hoard's Dairyman for $1.25.

To those who would like to inquire further I would advise them to take the course in Agriculture at the Utah Agricultural College. If they cannot take the four year course, take a shorter one, or, if not that, then the special winter course. The subject is thoroughly covered. We have all the references given and many more, to which the students have access.

Yours respectfully,

L. B. LINFIELD.

Utah Agr. Exp. Station, Logan.

NELLIE'S MISTAKE.

Christopher Walton was a "nuch," and Nellie Green had caught him. There was no doubt whatever, in her mind, that she had him and his millions as fast as ever fish was hooked by an angler.

So being rude, since to other girl in her circle was so pretty, since her wardrobe was perfect and her lover entirely subjugated, Miss Nellie had time to note the soft expression that came into Ruth Hazard's eyes when Oliver Lynn's name was mentioned.

Now, Oliver Lynn was a poor young man, with no great personal attractions, one by no means a "catch" in any sense of the word, and Miss Nellie had no idea of passing for him, or even a part of it, in monopolizing a small salary.

However, she could not resist the temptation of robbing Ruth Hazard of her one beau—the only one plain, pale little Ruth had ever had.

Oliver Lynn was just the man to admire a beautiful face, and here contrasted to such advantage with Ruth's. Ruth, moreover, had no pretty clothes and was only her poor self.

And if Mr. Walton grew angry she could tell him how she had refused Mr. Lynn, "because she liked some one else better," and win him back in an instant.

And Oliver Lynn, though he knew Ruth to be as pure and good, was cajled and smiled over from her side to that of her dazzling rivals, and soon seemed to forget, when she was over, that Ruth existed.

Ruth was only 18 and not in the least vain. She had built castles in the air, in which a pretty second floor and socks in a basket really to date figured conspicuously.

But she was a very sensible little creature, and after the first pang she said to herself, "Better to know that he is fickle now than to have married him and then discovered it."

Ruth did not "fight" for her beau at all. She was promptly jilted at once. One day she came quietly to Nellie Green and made her goodby.

"I'm wants me home again," she said. "And I am not fond of the city, as you know."

"It is all over now," said little Ruth, gazing mournfully at the flying landscape from the window of the train. "I am so glad that I don't care any more for him, but I wish that I had never met him."

And just then a gentleman, carrying a bag in his hand, brushed past her, overset a parcel on the seat, paused to apologize and so brought on a mutual recognition.

"Miss Hazard!" cried he.

"Mr. Walton!"

"You are not going home?"

"Yes," said Ruth; "mother wants me."

Mr. Walton looked convinced. To himself he said:

"That rascal Lynn has jilted her. Not. He is beautiful, but no excuse for deserting such a sweet little creature. There's something in her besides sweetness, too, I fancy."

He told her that he was going to Waterford on business, and Nellie lived just a mile this side of Waterford. And she told him of the woods, and the mossy streams that grew so after one night's rain, and of the beautiful rainbows that crowned the peaks, and of the way the moss rose round and golden stars them in the winter nights.

Then he opened a certain window in his soul, usually closed tight, and talked to Ruth Hazard as he had never talked to Nellie Green.

Strangely in the midst of this talk came a frame shaking scream, a backing of the engine, a crash and the sound of horror stricken voices.

A few moments afterward Ruth came to consciousness to find herself among the debris of the car, clasped tight in what seemed a death grip. It was Mr Walton who held her, but he knew nothing of the incident, for mother spoke her stirred.

When they unclasped his fingers, they fell down upon his breast like those of a dead man.

The results of the surgeon, Ruth's father, was that Mr. Walton was neither dead nor going to die, but he took him to his own home, nevertheless, and did his best for him, and soon he had a convalescent on his hands instead of an apparently dying patient.

Meanwhile in the city they knew nothing of the accident, and Miss Nellie, with the story of Oliver Lynn and anxious for the Hazard's return, did her best to bring her fish to the point of landing, that she might give him a cold douche of refusal.

At last one day Mr. Oliver, with many blushes and much confusion, informed Miss Nellie that he should be sad and offered her his hand and heart.

On the steps he met another gentleman—Mr. Walton. They bowed, but did not speak. And in a moment more Miss Nellie gave both hands to her returned captive.

"Oh naughty man," she said. "What will you have to do to atone?"

"A very short time, considering the experience it has given me," said Mr. Walton. "You've had no news of the cousin, I see."

"The what?" cried Nellie.

"The railroad accident," said Mr. Walton. "Your cousin Ruth was on the train."

"Not hurt, I hope!" cried Nellie.

"No," said Mr. Walton, "but I had a rib or two broken, and my brains very nearly knocked out, I believe. I've been at your uncle's house, and I tell you it's worth being ill to recover in such hands."

"I think that I should not have known of all this!" cried Nellie pathetically.

"Yes," said Mr. Walton coolly; "it was odd. By the way, how is Mr. Lynn? All settled between you two, I suppose, by this time?"

"Yes; it is settled," she said. "The foolish fellow really asked me to have him today, but I told him that—that—I liked some one better."

"That was very cruel of you, Miss Nellie," said Mr. Walton cautiously. "But the other man is a very happy fellow. I know from my experience. She's a little angel. Our cousin Ruth of course, just since to be my Ruth very soon now, she promised me that last night, and told me I might tell you."

And Nellie had just self control enough to murmur that she was delighted.—Exchange.

His Account With the Dentist.

Brown has the reputation of being one of the most miserly of men, but he pinions himself on his remarkable sense of justice. For 15 years he was his dentist. $22 for filling a front tooth with gold, refusing to pay it because he said the bill was exhaustive. The other day the filling came out. He took the gold to a jewelry store and had it valued. Then he wrote to the dentist and inclosed a check for his account, based on the following computation: "Actual value of the gold, $3.50; amount of labor (which I deem liberal), $5; for use of the tooth 15 years, $5; total, $13.50. I return gold on account and inclose check for the balance $10."—Washington Post.

News and Notes.

It is estimated by the department of agriculture that the 1895 corn crop will be one of the most valuable ever produced, 2,000,000,000 bushels.

It is the fashion now to spray whitewash paint on interiors of houses and outbuildings.

The drought has been particularly severe in Illinois, Wisconsin, Indiana, Michigan, Ohio, Kansas, eastern Missouri and eastern Iowa. In these states and sections wheat and oats made short crops and hay is very light.

There seems little room for doubt that large quantities of American corse meat are being consumed in this country and abroad.

A KNIFE

is not the hand of a surgeon gives you a feeling of danger and dread. There is no longer any necessity for its use in most diseases, as they yield to honorable treatment without cutting.

The Triumph of Conservative Surgery

is well illustrated by the fact that RUPTURE or hernia, is now radically cured without the knife and without pain. Clumsy, painful trusses are no longer necessary. They were cast off by tens of thousands last year, never to return. Cancers, tumors, fibroid (uterine) and many others, are now removed without the pain of cutting operations. Piles, fistula and other diseases of the lower bowel, are permanently cured without pain or resort to the knife. STONE in the bladder, no matter how large, is crushed painlessly, washed out and completely removed without cutting. STRICTURE of Urinary Passage is also hundreds of cases, for pamphlet, references and all particulars, send 4c stamps to the World's Dispensary Medical Association, 663 Main street, Buffalo, N. Y.

MOTHERS

and those soon to become mothers, should know that Dr. Pierce's Favorite Prescription rubs childbirth of its terrors, pains and dangers to both mother and child, by aiding nature in preparing the system for parturition. Thereby "labor" and the period of confinement are greatly shortened. It also promotes the secretion of an abundance of nourishment for the child.

Mrs. Dora A. Gutman, of Dallas, Gaston Co., Tex., writes: "Before I began taking Dr. Pierce's Favorite Prescription, I was not able to do my work without suffering almost death. Now I do all my housework, washing, ironing, sewing and everything for my family of eight. I can scarcely see that I have been ill six years. Your Favorite Prescription is the best medicine unknown, as it has proved so with me. I never suffered as little with any of my children as I did with my last."

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Salt Lake Stake.

President: Angus M Cannon, Salt Lake City.
Counselors: Joseph E Taylor, Charles W Parry, Salt Lake City.

Salt Lake City Wards.

WARDS.	BISHOPS.
First	Joseph Warburton
Second	Leonard G Hardy
Third	Thomas Maycock
Fourth	Harrison Sperry
Fifth	Samuel M T Seddon
Sixth	James C Watson
Seventh	William Woods
Eighth	Elijah F Sloan
Ninth	Samuel A Woolley
Tenth	Adam Spriggs
Eleventh	Robert Morris
Twelfth	Hyrum B Clawson
Thirteenth	Nelson A Empey
Fourteenth	George H Taylor
Fifteenth	Elias Morris
Sixteenth	Frederick Kesler
Seventeenth	John Tingey
Eighteenth	Orson F Whitney
Nineteenth	Isaac Barton
Twenty-first	George Romney
Twenty-second	Alfred Solomon
Twenty-third	Geo R Jones

Country Wards.

WARDS.	BISHOPS.
Big Cottonwood (Brinton)	D B Brinton
Bluff Dale (Mt Jordan)	Lewis H Mousley
Brighton (near E Schoenfield, Z C M I)	
S L City	Frederick W Schoenfeld
Centre (Salt Lake City)	Albert W Davis
Draper	Wm C Allen
Dry Creek Branch (Draper)	Soren Jensen, P E
East Mill Creek (Neff)	John Neff
Farmers (S L City)	Henry F Burton
Granite (Butler)	Alvah Butler
Grange	Daniel McRae
Herriman	Robert Daniels
Hunter (S L City)	William Miller
Mill Creek	James C Hamilton
Mountain Dell	William B Hall
North Jordan (Taylorsville)	H Beddoe
North Point (S L City)	
Pleasant Green (Riter)	Hyrum Tolmenor
Riverton (Sale)	Orson P Miller
Sugar House	Appollos C Driggs
South Cottonwood	Joseph S Rawlins
Sandy	James Jensen
South Jordan (Sale)	William A Bills
Union	Samuel Phillips
West Jordan	John A Egbert

San Juan Stake.

President: F A Hammond, Bluff.
Counselors: William Halls, Mexican Platt D Lyman, Bluff.

San Juan County, Utah.

WARDS.	BISHOPS.
Bluff	Jens Nielsen
Monticello	P I Jones

Grand County, Utah.

WARDS.	BISHOPS.
Moab	H H Stewart

Mesticosa County, Colorado.

WARDS.	BISHOPS.
Manson	George Halls

San Juan Co., New Mexico.

WARDS.	BISHOPS.
Jackson Branch	F A Brown P E
Burnham (Fruitland)	L C Burnham
La Plata (Farmington)	F A Young P E

Salt Lake Stake.

President: Albert R Smith, Manassa.
Counselors: Levi F Heim, Manassa, Thos A Crowther, Sanford.

Conejos County, Colorado.

WARDS.	BISHOPS.
Manassa	John C Dalton
Richfield	Ephraim Coombs
Sanford	S C Pulsipher

Rio Arriba County, New Mexico.

WARDS.	BISHOPS.
Beulah	Anthel Fuller

Sanpete Stake.

President: Canute Peterson, Ephraim.
Counselors: Henry Beal, Ephraim; John D Mathews, Manti.

Sanpete County, Utah.

WARDS.	BISHOPS.
Chester	Christen Christensen
Ephraim, North	Lars S Anderson
" South	Jonathan H Dorius
Fairview	James C Peterson
Fayson	John Bethelomew
Fountain Green	Christian J Christensen
Gunnison	C A Madsen
Indianola	Peter Peterson
Mayfield	Farley Christensen
Manti, North	Wm T Reid
" South	Hans Jensen
Mount Pleasant	C N Lund
Moroni	John W Irons
Spring City	James A Allred
Sterling	Niels C Christensen
Milburn	James M Stewart
Wales	John E Rees

Sevier Stake.

President: Wm H Seegmiller, Richfield.
Counselors: W H Clark, Joseph S Horne.

Sevier County, Utah.

WARDS.	BISHOPS.
Annabella	Joseph W Fairbanks
Aurora	Wm H Sherman
Burrville	Henry A Tarpley
Elsinore	John I Jens n
Glenwood	Herbert H B H
Inverary	Barnard H Greenwood
Joseph	George Charlesworth
Marysvale	C A Prom
Monroe	Orson Magleby
Richfield	Theodore Brierley
Redmond	Hans Rasmussen
Salina	James S Jensen
Sig ri	John Jensrup
Vermillion	Peter G Gardeson

Piute County, Utah.

WARDS.	BISHOPS.
Koosharem	E A Bagley

Snowflake Stake.

President: Jesse N Smith, Snowflake.
Counselors: L H Hatch, Woodruff; J H Richards, St Joseph.

Apache County, Arizona.

WARDS.	BISHOPS.
Pleasant	Niels Peterson
Springerville	John Hunt
Shumway	Hans Hansen
St Joseph	John Bushman
Taylor	Mr M Wilcox
Woodruff	Levi M Savage

Cochise County, Arizona.

WARDS.	BISHOPS.
Tuba	David Brinkerhoff
Tonto Basin	Alfred V Randall, P C

Star Valley Stake.

President: George Osmond, Afton.
Counselors: Wm W Burton, Anson V Call, Afton.

Uinta County, Wyoming.

WARDS.	BISHOPS.
Afton	Chas O Carter
Freedom	James Jensen
Fairview	John H Busby Jr
Auburn	J H Holbrook
Cottonwood	Wm Francis
Osmond	J W Thomas
Freedom	Arthur B Clark

St. George Stake.

President: Daniel D McArthur, St George.
Counselors: Anthony W Ivins, Jerome B Snow, St George.

Washington County, Utah.

WARDS.	BISHOPS.
Bellevue	Andrew Gregerson, P E
Dixie	David E Ott, P E
Foster	Wm Chadburn, P E
Glen Edwin	Edwin Hamblin, P E
Gunlock	James M Bailey, P E
Santa Clara	Franklin D Hall
Hamblin	George A Holt, P E
Harmony	Wm A Redd
Harrisburg	Orson B Adams, P E
Leeds	Thomas S Terry
Leeds	Brigham Y McMullin
Middleton	Richard Prince, P E
Mountain Dell	Wm Isom, P E
Pine Valley	Wm Gardner
Pinto	Robert Knell
Price	N R Pawson
Rockville	Gottlieb Hirschi
Santa Clara	J G Hafen
Shoeshong	Oliver De Mill, P E
Springdale	Wm R Crawford
St George, First	Thomas Judd
" Second	Alex F Jarvis
" Third	Edwin G Bradford
" Fourth	Thos P Cottam
Tuacarville	Wm A Bringhurst
Virgin	Leroy W Boyle
Washington	Andrew Spence
Westover	Chas Webster, P E

Lincoln County, Nevada.

WARDS.	BISHOPS.
Bunkerville	Edward Bunker, Jr
Clover Valley	Lyman L. Woods, P E
Eagle Valley	John E Hammond, P E
Overton	Brigham Williams
Panaca	
Spring Valley	Artemus Miles, P E

Yavapai County, Arizona.

WARDS.	BISHOPS.
Beaver Dams	Albert Frehner, P E

St. Joseph Stake.

President: Christopher of Layton, Thatcher.
Counselors: W D Johnson, M H Merrill, Thatcher.

Graham County, Arizona.

WARDS.	BISHOPS.
Curtis	A L Wilkin
Central	Joseph C