

Agro's Dictionary of
Dairy Science



Mohana Swamy

Agro's Dictionary of Dairy Science

SECOND REVISED EDITION

Mohana Swamy



AGROBIOS (INDIA)

Published by:

AGROBIOS (INDIA)

Agro House, Behind Nasrani Cinema

Chopasani Road, Jodhpur 342 002

Phone: 91-0291-2642319, Fax: 2643993

E. mail: agrobios@sify.com



AGROBIOS (INDIA)

First Edition: 1995

Impression: 2000

Second Edition: 2006

© All Rights Reserved, 2006

All rights reserved. No part of the book or part thereof, including the title of the book, be reprinted in any form or language without the written permission of the author and the publishers. The copyists shall be prosecuted.

ISBN No.: 81-7754-288-5

Price: Rs. 495.00 / US\$ 27.00

Published by: Dr. Updesh Purohit for Agrobios (India), Jodhpur

Lasertypeset at: Shriya Computers and Printers, Jodhpur

Cover Design by: Reena

Printed at: Bharat Printers, Jodhpur

Preface

India is predominantly an agricultural country and the dairying is recognized as an instrument for social and economic development because milk is the largest crop after rice in Indian agriculture. At total output of some 58-60 mmt of milk per year, the Indian dairy sector becomes a Rs. 30,000 crore economy excluding the joint-economy of the drought power which by no means is small. Dairy industry has achieved tremendous progress in country that is now faced with surplus stock of milk in some states of India.

This developing industry still needs literature to educate the masses, and the present work is an effort in this direction. This will serve as a reference book for all students of dairy science, veterinary science, agriculture, medical, biology, etc. It covers the whole range of dairy science terms and includes essential entries from such fields as marketing, technology, diseases, physiology, nutrition etc. Entries on many modern fields and laboratory techniques are also included. Each term in this dictionary has been defined with the utmost accuracy, completeness and easy readability.

The dictionary achieves its purpose to give you an authoritative source to which you can turn with confidence for meaning and knowledge of the common, specialized and latest terms which have been introduced with the recent development in the field. A dictionary of this standard and quality has been a long felt need of the students to enable them to meet the challenges of the present day result-oriented education system.

Author

Contents

Glossary A to Z 1 - 194

Appendix 1: Microbiology of Milk..... 195

Appendix 2:

- Table 1: Per capita consumption (kg) of milk and milk products in various countries, 2000 data. 203
- Table 2: Cow milk production in selected countries in the world (2002). 203
- Table 3: Composition of milk from different mammalian species (per 100 g fresh milk) 204
- Table 4: Concentration of proteins in milk. 204
- Table 5: Composition of human milk. 204
- Table 6: Composition of colostrum and early milk 205
- Table 7: Comparison of the nutrient content per 100 cal of whole Milk, Skim milk, Cheddar Cheese and Cottage Cheese 205
- Table 8: Composition of goat's milk..... 206
- Table 9: Composition of ewes milk 206
- Table 10: Composition of water buffalo's milk..... 207
- Table 11: Composition of mare's milk (vieth) 208
- Table 12: Composition of milk of various animals..... 208
- Table 13: General composition of cow's milk 208

Table 14:	Various Milk products.....	209
Table 15:	Amount of bacteria in milk from cows kept under different conditions	209
Table 16:	Number of bacteria in milk.....	209
Table 17:	Change of the number of bacteria during storage of milk.....	209
Table 18:	Various temperature range and the time period of bactericidal stage	210
Table 19:	Taxonomic Classification of <i>Salmonella</i>	210
Table 20:	Diseases associated with drinking raw milk.....	211
Table 21:	Temperature relation with dominant microflora.....	212
Table 22:	Some lactic acid bacteria commonly used in cheese making.....	212
Table 23:	Key for presumptive identification of obligately homofermentative and facultatively heterofermentative species of the genus <i>Lactobacillus</i>	213
Table 24:	Key for presumptive identification of obligately heterofermentative species of the genus <i>Lactobacillus</i>	214
Table 25:	Bacteriocins isolated from different <i>Lactobacillus</i> species.....	215
Table 26:	Antagonistic activities caused by lactic acid bacteria.....	216
Table 27:	Production stages for cream Raw milk tested.....	216
Table 28:	Production stages for butter from Cream or soured cream.....	216
Table 29:	Average compositional tables (Colostrum, % Composition: Cow's Milk).....	217
Table 30:	Steps in yoghurt-making:.....	217
Table 31:	The properties of casein.....	217
Table 32:	Microbiological standards for grade 'A' dairy products	218
Table 33:	Microbiological standards for grade dairy products	218
Table 34:	Mastitis and milk quality tests.....	219
Table 35:	Information derived from mastitis and milk quality tests.....	219
Table 36:	Testing at the farm for abnormal milk.....	220

Appendix 3: Important Animal Diseases..... 221

Actinobacillus 221

Actinomyces..... 221

Bacillus (Bacillus anthracis)..... 222

Borrelia (Borrelia gallinarium)..... 223

Brucella..... 224

Clostridium botulinum B. botulinum, B. botulinus..... 226

Clostridium septicum..... 226

Clostridium tetani Bacillus of Nicolaier, Plectridium tetani, B. tetani..... 227

Clostridium..... 228

Clostridius oedematiens Cl. novyi, B. oedematiens maligni-II..... 228

Clostridium welchii Synonyms: Cl. Perfringens B. welchii, B. aerogenes capsulatus..... 229

Corynebacterium equi..... 230

Corynebacterium ovis..... 230

Corynebacterium pyogenes..... 230

Escherichia..... 231

Formido (Formido-Rabies, Virus)..... 232

Haemophilus..... 234

Hostis pectoris (Virus)..... 236

Leptospira..... 238

Malleomyces..... 238

Mycobacterium paratuberculosis..... 239

Mycobacterium tuberculosis..... 240

Mycopl. mycoides-Var. Capri..... 242

Mycoplasma agalactia..... 242

Mycoplasma bovigenitale..... 243

Mycoplasma gallinarium..... 243

<i>Mycoplasma mycoides-Var. bovis</i>	243
<i>Pasteurella</i>	244
<i>Rickettsia</i>	245
<i>Salmonella</i>	246
<i>Spherophorus</i>	246
<i>The Spirochaetes</i>	247
<i>Tortor bovis</i>	247
<i>Tortor Equorum (African horse sickness virus)</i>	248
<i>Tortor furens (Ranikhet Disease Virus)</i>	250
<i>Vibrio</i>	251
Appendix 4: Milk Testing	253
Appendix 5 Examination of Butter	256
Appendix 6: Varieties of Sheep's Cheese	259
Appendix 7: European Varieties of Soft Cheese	260
Appendix 8: Sour Milk Cheese	261
Appendix 9: The Dosage Recommended for Typical Microorganisms that are Destroyed with UV Treatment	262
Appendix 10: Operation Flood Achievements	263
Appendix 11: Pollution Standards in Denmark	264
Appendix 12: Milk Utilization Pattern in India Expressed as Per Cent of Total Milk, Production	265
Appendix 13: BOD₅, and COD for Various Dairy Products and Domestic Sewage	266
Appendix 14: Pollution Load of Some Milk Products	267
Appendix 15: Environmental Areas Damaged by Dairy Industry and the Control Measures	268
Appendix 16: Major SMP Producing Countries (100 tonnes)	269

A

Abiotic. Referring to the absence of living organisms.

Abnormal milk (Mastitis milk). This general term is used to describe any type of milk that differs markedly from ordinary milk. In its restricted sense it is used to describe milk from the udder that is abnormal on account of udder disease or mastitis. Such milk is commonly low in solids-not-fat and sometimes in fat, low in lactose and calcium, and high in sodium chloride. The casein: globulin ration is also low, and the *pH* high and titratable acidity low.

Abomasum. The fourth or true stomach of ruminants. See Cow, internal organs of; Digestion in the ruminant; Enzymes; Rennet.

Abortion, contagious. This disease is a cause of serious loss to the dairy farmer and is caused by *Brucella abortus*, an organism closely related to the organism of undulant or Malta fever, *Brucella melitensis*. Its presence in milk is most easily detected by guinea-pig inoculation, but it can be isolated by inoculating infected milk into serum or liver agar containing gentian violet (1 in 200,000) and incubating at 37 in 10 per cent. CO₂ about 25 per cent. of samples of market milk are stated to be infected, but the number of reported cases of undulant fever is small. Some pathologists consider that many mild cases are never recognised as such by the general practitioner. The organism occurs in the blood of affected animals and so reactors can readily be detected by an agglutination test.

Abrasion. The roughening, scratching or indenting of a surface by mechanical action. Resistance to abrasion is most important property in metals in use in the dairy industry as crevices must be avoided on account of bacterial growth. Hardness is not the only property concerned;

elasticity and other properties play a part. It is important to avoid hard or tough metal knocking against a softer metal, *e.g.* steel against aluminium.

Absorption number, iodine. Unsaturated fats and fatty acids can absorb a certain amount of iodine and this quantity is characteristic for the fatty acid. In butter oleic acid is chiefly concerned, and the iodine values vary from 30 to 40.

Absorption of light. A coloured material will absorb certain light rays depending on the chemical structure and colour. Thus whey appears greenish because of the riboflavin. Such absorption can lead to catalysed reactions involving the destruction of colourless substance by sunlight, *e.g.* vitamins C in milk.

Absorption. A general term for the inclusion of a material in another. In dairying the phenomena of chief interest are (i) the absorption of odours by milk; (ii) the absorption of milk and bacteria by rubber and other similar materials, especially teat cup liners and milk lines (see Cleaning; Detergents; Milking machines); (iii) the absorption of foods by the cow.

Abstraction of fat. The abstraction of fat and addition of water are the two common ways of defrauding the buyer. While the addition of water can readily be detected by the freezing-point test there is no simple way of proving that fat has been removed on account of the highly variable amount in milk. Milk that contains less than 3 per cent. fat is presumed to be adulterated or not genuine until the contrary is shown and it is, of course, an offence to remove fat or any other constituent from milk. Low fat in milk may also be due to bona fide causes or to failure to mix a bulk properly or, quite commonly, to failure to strip properly after milking. The practice of putting a calf to a cow following incomplete stripping raises a difficult point in law.

Accredited milk. This grade disappears on 1st October, 1954.

Acellular. Lacking cellular organization; not having a delimiting cytoplasmic membrane, organizational description of viruses, viroids, and prions.

Acetic acid, carbon dioxide, hydrogen and a little formic acid are also produced.

Acetic acid. Acetic acid CH_3COOH is the second lowest member of the fatty acid series and is the chief acid constituent of vinegar. Its importance in dairying lies in the fact that it is the chief secondary product in the lactic

acid fermentation and so is an important flavour constituent in nearly all dairy products.

Acetoin (acetyl methyl carbinol). This substance has the formula $\text{CH}_3\text{CO.CH(OH).CH}_3$ and is of considerable interest as the precursor of diacetyl, the aroma substance of cream and butter.

Acetonaemia. The presence of acetone bodies in the blood. It indicates excess of fatty foods or excessive feeding or metabolic disorder.

Acetone. The simplest ketone $\text{CH}_3\text{CO.CH}_3$. It has a characteristic odour and is present in diabetic urine, blood and breath. It can be detected in the breath of cows if the feed is deficient in carbohydrate due to the failure of the animal to oxidise completely the fatty material.

Acetyl CoA. Acetyl coenzyme A; a condensation product of coenzyme A and acetic acid; an intermediate in the transfer of 2-carbon fragments, notably in their entrance into the tricarboxylic acid cycle.

Achromatic lens. An objective lens in which chromatic aberration has been corrected for two colours and spherical aberration for one colour.

Achromobacterium. A genus of gram-negative non-pigment forming, non-spore forming rods, attacking proteins and fat and causing taints in butter.

Acid Curd. The gel-like state that milk is brought to, when a high level of acidity is achieved. The acidity is produced by the activity of starter bacteria, and it precipitates the milk protein into a solid curd. The custard-like state that milk is brought to when a high level of acidity is created. The acidity is produced by the activity of starter culture bacteria, and it precipitates the milk protein into a solid curd.

Acid fast. The property of those bacteria, such as mycobacteria, that retain their initial stain and do not decolorize after washing with dilute acid-alcohol.

Acid foods. Foods with a pH value less than 4.5.

Acid mine drainage. Consequence of the metabolism of sulphur- and iron-oxidizing bacteria when coal mining exposes pyrite to atmospheric oxygen and the combination of autooxidation and microbial sulphur and iron oxidation produces large amounts of sulphuric acid, which kills aquatic life and contaminates water.

Acid-base equilibrium. Practically all aqueous solutions contain substances having acid or basic (alkaline) properties and the resultant equilibrium

defines the pH or hydrogen ion concentration which is of the greatest importance in dairying, being a major factor in the stability and keeping quality of all dairy products.

Acidic. A compound that releases hydrogen (H^+) ions when dissolved in water; a compound that yields positive ions upon dissolution; a solution with a pH value less than 7.0.

Acidimeter. In an endeavour to standardise the determination of the titratable acidity of milk a special acidimeter has been devised based on the recommendation of using 20 ml. of milk, whey etc., and 2 ml. of 0.5 per cent. indicator. The acidimeter consists of the following components: (a) A special burette marked to read 1/20 the true amount so that with 20 ml. milk the burette reading gives a direct value for *per cent. lactic acid*. (b) A second burette etched every 1 ml. but unnumbered. (c) A reservoir bottle for N/9 NaOH. (d) A reservoir bottle for 0.5 per cent. phenolphthalein in 50 per cent. alcohol. (e) Rubber tubing, glass tube joints, spring clips, etc. (f) A special stand or rest for the record book. (g) A suitable open-work frame for supporting the burettes and reservoirs. (h) Two white basins, flat-bottomed and non-rollable. (i) Stirring rods. (j) 20 ml. pipettes.

Acidity and pH of milk. Acidity: Freshly drawn milk is amphoteric in nature and the pH of normal, fresh, sweet milk usually varies from 6.4 to 6.6 for cow milk and 6.7 to 6.8 for buffalo milk.

Acidity of milk. Temperature and acidity (hydrogen ion concentration of pH) are the two most important factors controlling the behaviour of milk and its derivatives in the various processes employed in the dairy industry. The peculiar properties of acids or acidic substances in solution lie in the possession of hydrogen bound in such a way that it can readily split off and become a hydrogen ion. In different acids the degree of this splitting-off (or dissociation) varies considerably, and defines the strength of the acid, since acidity is due to hydrogen ions. The unit of acidity is the concentration of these ions or wandering hydrogen atoms, actual and potential, measured in grams per litre, and unit or alternatively contains 1 g. of hydrogen that is replaceable by a metal or that practice are due to rather small concentrations of hydrogen ions. Thus when a milk is just clotting because bacteria have soured it, the hydrogen ion concentration is about 1/100,000 g. per litre, *i.e.* milk clots at about at about pH 5. we are all familiar with the fact that the acidity of fresh milk is stated to be usually about 0.14 per cent. lactic acid.

Acidity. Freshly drawn milk is amphoteric in nature and the pH of normal, fresh, sweet milk usually varies from 6.4 to 6.6 for cow milk and 6.7 to 6.8 for buffalo milk. The amount of acidity (sourness) in the milk. Acidity is an important element in cheese making and it is produced by cheese starter culture bacteria.

Acidophilic. This term means acid-loving and is sometimes applied to lactobacilli which can grow at low pH values, e.g. *L. acidophilus*. It is doubtful, however, if this hybrid word is justified since although certain types of lactobacilli can grow at rather low pH values, the optimum value for growth and metabolism is much nearer the neutral point, e.g. pH 5 to 6. *Aciduric* is a more suitable description.

Acidophilus milk. A culture of *L. acidophilus* in milk is widely used for the treatment of cases of intestinal auto-intoxication by the metabolic products of protein-splitting and putrefactive bacterial. The original culture popularised for this purpose was that of *L. bulgaricus*, but it appears that this organism cannot flourish at the low surface tensions prevailing in the intestine. Acidophilus milk has largely replaced bulgaricus milk for this purpose. It has been claimed that the same beneficial effect is produced by the drinking of an equal volume of milk or even the same amount of lactose.

Acquired immune deficiency syndrome (AIDS). An infectious disease syndrome caused by HIV retrovirus, characterized by the loss of normal immune response system functions, followed by various opportunistic infections.

Acquired immunity. The ability of an individual to produce specific antibodies in response to antigens to which the body has been previously exposed based on the development of a memory response.

Activated sludge process. An aerobic secondary sewage treatment process using sewage sludge containing active complex populations of aerobic microorganisms to break down organic matter in sewage.

Active immunity. Immunity acquired as a result of individual's own reactions to pathogenic microorganisms or their antigens; attributable to the presence of antibody or immune lymphoid cells formed in response to an antigenic stimulus.

Added water. This fraudulent practice is fast dying out on account of the improvement of the freezing-point test for detecting it. It is usually suspected when the results of fat and solids-no-fat tests are low and

erratic. Water can be added accidentally, *e.g.* by using a leaky cooler. The freezing-point test can detect 3 per cent. or more added water in herd bulks and 1 per cent. or more in tanker bulks (3000 gallons). Quality payment would solve the problem and dispense with the present cumbersome procedures and unsatisfactory and time-consuming prosecutions.

Adenosine triphosphate (ATP). A major carrier of phosphate and energy in biological systems, composed of adenosine and three phosphate groups; the free energy released from the hydrolysis of ATP is used to drive many energy-requiring reactions in biological systems.

Adhesion. The sticking together of two surface due to strong molecular attraction.

Adiabatic. A change without gain or loss of heat.

Adjuvants. Substances that increase the immunological response to a vaccine and, for example, can be added to vaccines to slow down absorption and increase effectiveness; substances that enhance the action of a drug or antigen.

Adsorption. This may be loosely defined as the adhesion of matter (gas, liquid, or solid) to surfaces (liquid or solid). Scientifically, adsorption may be defined as concentration changes at an interface. The fundamental aspect of adsorption is thermodynamic, *i.e.* the concept of energy. If a solute (dissolved substance) raises the potential energy at an interface, the solute will tend to leave the interface and vice versa.

Adulteration. Strictly speaking this term means the addition of forbidden substances to foods, but in dairying it almost invariably refers to the addition of water to milk.

Aeration. Applied to milk this term means the occlusion of tiny bubbles of air due to splashing, leaking glands in pumps, etc.

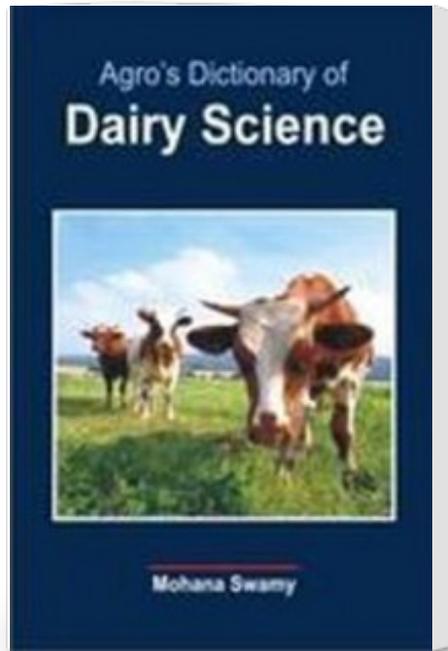
Aerobacillus. A genus of spore-forming bacteria intermediate in character to the aerobic and the anaerobic Clostridium.

Aerobic bacteria. Bacteria requiring oxygen for growth.

Aerobic. In the presence of air, *i.e.* oxygen. The term is used physiologically to mean in the presence of air, and bacteriologically to mean requiring air.

Aerosol. A fine suspension of particles or liquid droplets sprayed into the air.

Agros Dictionary of Dairy Science



Publisher : Agrobios Publications ISBN : 81-7754-288-5

Author : M Swamy

Type the URL : <http://www.kopykitab.com/product/3130>



Get this eBook