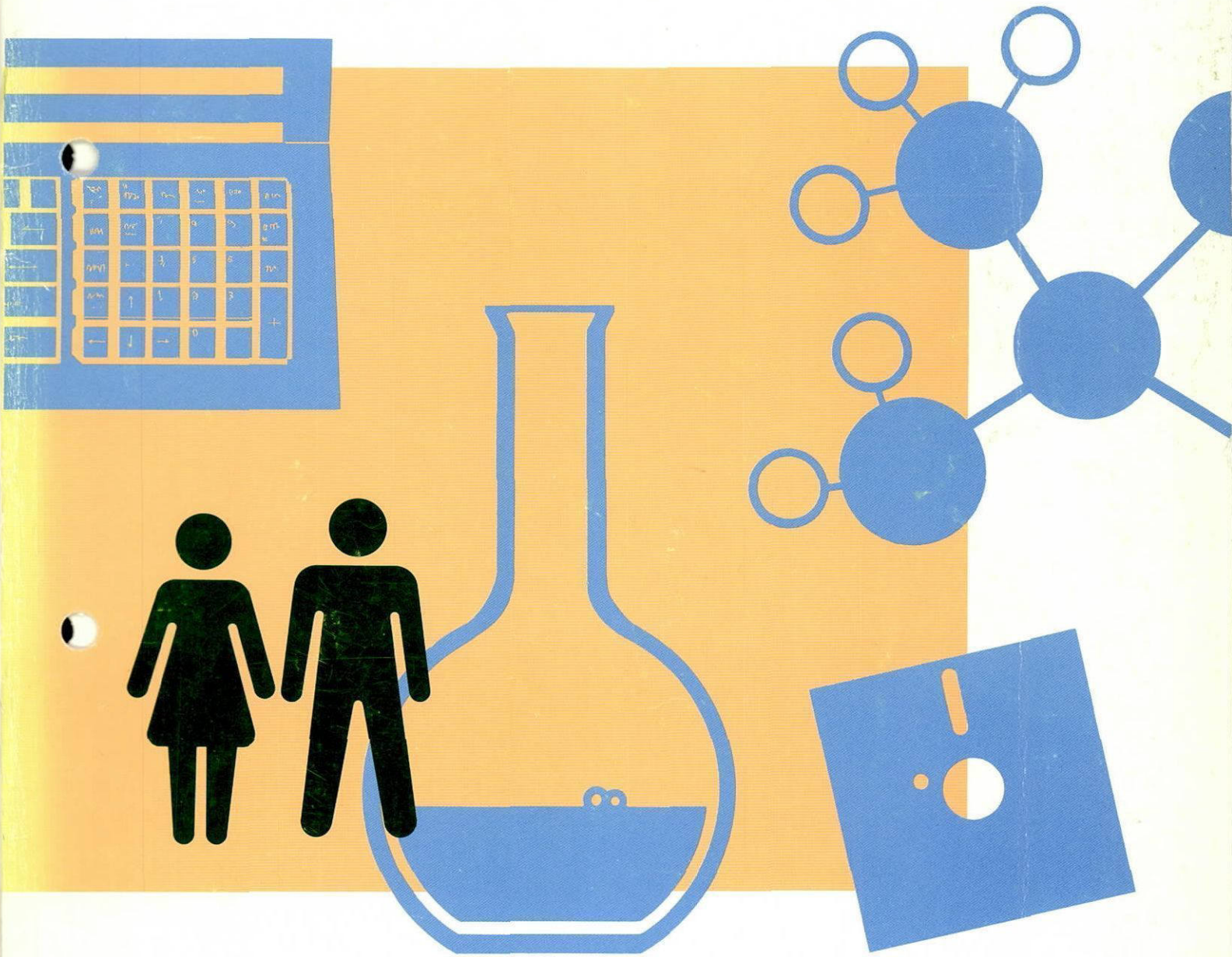
14-16

SATIS 11



Science & Technology in Society

SATIS

About SATIS

Science and Technology in Society (SATIS) is a project of the Association for Science Education, funded by charity and by industry.

This new publication forms part of the revision and extension of the SATIS project for students in the 14 to 16 age range. It is a set of ten resource units linking major science topics to important social and technological applications and issues. Each unit usually takes one to two hours to complete.

SATIS units are intended to support science courses. Many have found wider application within the school curriculum.

There are now twelve books of ten units. Each unit is numbered in a system giving the number of the book followed by the number of the unit within it. Thus the first unit in the first SATIS book is numbered 101 and the last in the twelfth book is 1210.

The revision and extension of the original SATIS Project has been made possible by a generous grant from the Gatsby Charitable Foundation and by the people from schools, universities, industry and the professions who volunteered to write, develop and trial it.

List of units in this book

First Published 1991 by the Association for Science Education.

The Association for Science Education
College Lane, Hatfield, Herts AL10 9AA

ISBN 0 86357 140 9

Produced by Communications Management International

Material for students aged 14 to 16 (or 17)

SATIS units

Copyright-waived material for photocopying

SATIS 1 to 7	(published 1986)
SATIS 8 to 10	(published 1988)
SATIS 11 and 12	(published 1991)
General Guide for Teachers	(published 1986)

SATIS Audiovisual

Tape-slide programmes

1 *Acid from the air* – a programme about acid rain
2 *More wheat for better bread* – a programme about the impact of science and technology on agriculture
3 *More and more people* – a programme about human population growth
4 *Dams, people and the environment* – a programme about the environmental effects of dams
5 *Radiation around us* – a programme about low-level radiation
6 *Bridges* – a programme about the design and construction of bridges

SATIS topics 14–16

Audio tapes

A series of 24 topics, each lasting 7 minutes or so, which were originally broadcast by BBC Schools Radio in 1989–90. They were devised to support and enhance SATIS printed material. These programmes are now available on C-60 audio cassettes from the ASE.

109	Nuclear Power
206	Test-tube Babies
207	The Story of Fritz Haber
302	Living with Kidney Failure
304	A Medicine to Control Bilharzia
307	Chemicals from Salt
309	Microbes make Human Insulin
402	DDT and Malaria
406	Blindness
407	Noise
409	Dam Problems
502	The Coal Mine Project
504	How Safe is Your Car?
601	Electricity on Demand
602	The Limestone Inquiry
603	The Heart Pacemaker
607	Scale and Scum
801	The Water Pollution Mystery
802	Hypothermia
806	Stress
807	Radiation – how much do you get?
903	What are the Sounds of Music?
907	Your Stars – revelation or reassurance?
1010	Can it be done? Should it be done?

Teachers' programme

The SATIS Atlas *(publication 1992)*

The SATIS Atlas comprises a set of copyright-waived maps giving information and data linked to the science curriculum with associated questions for students to answer.

SATIS materials are available from

ASE Booksales,
The Association for Science Education,
College Lane, Hatfield, Herts AL10 9AA
Tel. 0707 267411 Fax 0707 266532

List of units in the SATIS 14–16 series

SATIS 1

101 Sulphurcrete
102 Food from Fungus
103 Controlling Rust
104 What's in our Food? – a look at food labels
105 The Bigger the Better?
106 The Design Game
107 Ashton Island – a problem in renewable energy
108 Fibre in your Diet
109 Nuclear Power
110 Hilltop – an agricultural problem

SATIS 2

201 Energy from Biomass
202 Electric Vehicles
203 Drinking Alcohol
204 Using Radioactivity
205 Looking at Motor Oil
206 Test-tube Babies
207 The Story of Fritz Haber
208 The Price of Food
209 Spectacles and Contact Lenses
210 The Pesticide Problem

SATIS 3

301 Air Pollution – where does it come from?
302 Living with Kidney Failure
303 Physics and Cooking
304 A Medicine to Control Bilharzia – Part 1
305 A Medicine to Control Bilharzia – Part 2
306 Fibre Optics and Telecommunications
307 Chemicals from Salt
308 The Second Law of – What?
309 Microbes make Human Insulin
310 Recycling Aluminium

SATIS 4

401 Fluoridation of Water Supplies
402 DDT and Malaria
403 Britain's Energy Sources
404 How would you Survive? – an exercise in simple technology
405 The Label at the Back – a look at clothing fibres
406 Blindness
407 Noise
408 Industrial Gases
409 Dam Problems
410 Glass

SATIS 5

501 Bridges
502 The Coal Mine Project
503 Paying for National Health
504 How Safe is Your Car?
505 Making Fertilizers
506 Materials for Life
507 Computers and Jobs
508 Risks
509 Homoeopathy – an alternative kind of medicine
510 Perkin's Mauve

SATIS 6

601 Electricity on Demand
602 The Limestone Inquiry
603 The Heart Pacemaker
604 Metals as Resources
605 The Great Chunnel Debate
606 The Tristan da Cunha Dental Surveys
607 Scale and Scum
608 Should we Build a Fallout Shelter?
609 Hitting the Target – with monoclonal antibodies
610 Robots at Work

SATIS 7

701 Electricity in your Home
702 The Gas Supply Problem
703 Vegetarianism
704 Electric Lights
705 Physics in Playgrounds
706 Dry Cells
707 Artificial Limbs
708 Appropriate Pumps
709 Which Anti-acid?
710 What is Biotechnology?

SATIS 8

801 The Water Pollution Mystery
802 Hypothermia
803 The Technology of Toilets
804 Electrostatic Problems
805 The Search for the Magic Bullet
806 Stress
807 Radiation – how much do you get?
808 Nuclear Fusion
809 Ball Games
810 High Pressure Chemistry

SATIS 9

901 The Chinese Cancer Detectives
902 Acid Rain
903 What are the Sounds of Music?
904 Which Bleach?
905 The Impact of IT
906 IT in Greenhouses
907 Your Stars: Revelation or Reassurance?
908 Why not Combined Heat and Power?
909 AIDS
910 Disposable Nappies

SATIS 10

1001 Chocolate Chip Mining
1002 Quintonal: an industrial hazard
1003 A Big Bang
1004 Lavender
1005 Mental Illness
1006 As Safe As Houses
1007 240 Volts Can Kill
1008 Why 240 Volts?
1009 Trees as Structures
1010 Can it be done? Should it be done?
Index to SATIS 1 to 10

SATIS 11

1101 Breast or Bottle?
1102 A Special Type of Hearing Aid
1103 Save the Salmon!
1104 Materials to Repair Teeth
1105 Radon in Homes; Radon – an Investigation
1106 Tin Cans
1107 The Eruption of Mount St Helens
1108 Telephones
1109 Electricity Supply and Demand
1110 Project Management

SATIS 12

1201 Agrochemicals and the Environment
1202 Mapping the Human Genome
1203 Prospecting by Chemistry
1204 From Babylon to Biotechnology
1205 Earthquakes
1206 The Greenhouse Effect
1207 Radiotelescopes
1208 Are there Fairies at the Bottom of the Garden?
1209 Are you made of Stardust?
1210 Bottled Water

Science National Curriculum attainment targets

The following list suggests how SATIS units may be linked with the attainment targets of the Science National Curriculum. Many units link with several attainment targets. The brackets indicate links with only a minor part of that unit.

AT 1	*Exploration of science*	110 201 205 208 209 210 405 505 509 606 706 709 801 807 809 904 907 910 1001 1004 1007 1008 1009 1101 1103 1104 1105ab 1106 1110 1201 1203 1205 1208
AT 2	*The variety of life*	102 201 (208) 210 304 402 404 505 (703) 906 1004 1009 1201
AT 3	*Processes of life*	102 104 108 110 (201) 203 206 208 302 (304) 309 401 402 503 506 508 509 603 606 (608) (609) 703 707 802 (803) 805 806 901 909 1002 (1005) 1101 1204 1210
AT 4	*Genetics and evolution*	309 807 901 (1004) (1103) 1202 1204
AT 5	*Human influences on the Earth*	301 304 308 310 401 402 404 409 410 502 602 605 (607) 708 801 803 902 1001 1103 1106 1201 1203 1210
AT 6	*Types and uses of materials*	101 (405) 408 410 506 604 (910) 1104 1106
AT 7	*Making new materials*	102 103 105 207 (305) 307 310 405 502 505 510 604 (607) 709 810 (904) 1001 1003 1004 1103 1106 1204
AT 8	*Explaining how materials behave*	(109) 204 205 (305) 608 807 808 (1004) 1105ab
AT 9	*Earth and atmosphere*	(602) 1107 1205 1206
AT 10	*Forces*	501 504 705 (708) 809 (1006) (1009)
AT 11	*Electricity and magnetism*	701 704 804 908 1007 1008 (1101) 1108 1109 1208
AT 12	*IT and microelectronics*	306 507 (603) 610 905 906 (1101) 1102 1108 1109 1208
AT 13	*Energy*	106 107 109 201 202 303 308 403 409 502 504 508 702 704 705 (706) 802 807 808 809 908 (1006) (1101) 1109
AT 14	*Sound and music*	407 705 903 1102
AT 15	*Using light and electromagnetic radiation*	209 303 306 406 (704) 1207
AT 16	*The Earth in space*	1209
AT 17	*The nature of science*	207 305 (306) 309 509 510 609 805 (810) (901) 907 1108 1202 1204 1208

Subject areas

The following are units with strong links to specific subject areas.

Biology	102 104 108 110 201 203 204 206 208 209 210 301 302 304 305 308 309 401 402 404 406 407 409 503 506 508 509 606 609 703 707 801 802 803 805 806 901 902 906 909 1002 1004 1005 1006 1009 1010 1101 1102 1103 1104 1105a 1201 1202 1204
Chemistry	101 103 105 110 203 204 205 207 210 301 305 307 308 310 401 402 404 405 408 410 502 505 506 510 602 604 607 702 706 709 801 810 902 904 910 1001 1002 1003 1004 1010 1103 1104 1106 1203 1204 1210
Physics	106 107 109 202 204 205 209 303 306 308 403 404 407 501 504 507 508 601 603 608 610 701 702 704 705 706 708 802 803 804 807 808 809 903 905 907 908 1006 1007 1008 1009 1010 1101 1102 1105ab 1106 1108 1109 1207 1208 1209
Geography	106 107 109 110 208 301 304 403 404 409 502 505 602 604 605 708 901 902 1001 1105a 1107 1109 1203 1205 1206
Sixth-form General Studies	102 104 105 106 107 108 109 110 203 204 206 207 208 301 302 308 309 404 405 407 409 502 503 507 508 509 605 607 608 610 703 802 803 806 807 808 901 902 905 906 907 908 909 910 1002 1003 1005 1010 1101 1105a 1109 1110 1202
Technology	102 103 104 106 107 108 201 202 205 208 303 305 306 308 404 405 407 410 501 503 506 507 603 605 610 707 708 802 803 905 906 1006 1010 1101 1103 1106 1110

Cross-curricular themes

Many SATIS units include cross-curricular themes. This list is for general guidance only and was compiled before National Curriculum Council publications were available.

Health Education	102 104 108 203 204 206 208 209 302 304 305 309 401 402 404 406 407 503 506 508 509 603 606 608 609 703 707 708 709 802 803 805 806 807 901 904 909 910 1002 1005 1007 1010 1002 1005 1007 1010 1101 1102 1104 1105a 1202 1210
Environment	101 107 108 201 202 210 301 307 308 402 404 407 409 410 502 505 508 602 605 703 801 803 902 1001 1010 1103 1106 1201 1203 1205 1206
Careers	507 610 905
Citizenship	104 109 203 206 207 302 406 407 409 502 503 504 507 508 602 605 607 608 705 807 905 1002 1003 1005 1106
Economic and Industrial Understanding (listed as 'Economic Awareness' in the text)	102 103 105 106 202 208 210 302 307 310 403 408 503 604 605 610 701 703 704 709 904 905 908 1001 1004 1010 1001 1004 1010 1103 1106 1201 1204 1210

Breast or Bottle?

Science content

Nutrition and health, microbes and disease, electrical circuits, thermostatic control.

Science curriculum links
AT1 Exploration of science
AT3 Processes of life
AT11 Electricity and magnetism
AT12 IT including microelectronics
AT13 Energy

Syllabus links
- GCSE Science, Biology, Physics
- Sixth-form General Studies
- Technology

Cross-curricular themes
- Health Education

Lesson time
1 hour or more
(depending on parts done)

Links with other SATIS materials
104 What's in our Food?
910 Disposable Nappies

NERIS
Search on
BREAST FEEDING
or on MILK and HEALTH EDUCATION

Author **Ann Fullick**
Part C **Stephen Marsh**
Drawings **Joyce Curtis**

First published 1991

SUMMARY

This unit deals with the nutritional aspects of breast and bottle feeding in Great Britain and the developing world. A design brief enables students to explore the possibilities of thermostatic control.

STUDENT ACTIVITIES

☐ **Part A Why milk?**
Reading and answering questions, producing a comparative table, data handling, research and discussion, role-play situations.

☐ **Part B Bottle feeding in the developing world**
Devising a short play, writing a story for children, discussion.

☐ **Part C Design a baby's bottle warmer**
A design brief: 12 V circuits, measurement of volume/mass and temperature rise, simple thermostatic control.

AIMS

☐ To raise awareness and promote discussion of the nutritional aspects of breast and bottle feeding

☐ To provide opportunities for developing graphical communication and role-play skills with mini role-play activities

☐ To provide design opportunities within the context of infant nutrition

USING AND ADAPTING THE UNIT

☐ This unit links with work on health and nutrition and on child care. Part C links with work on control and the heating effect of a current.

☐ The unit may be adapted for a range of abilities by selecting appropriate parts and activities.

APPARATUS REQUIREMENTS FOR PART C

If work is linked to current electricity: 12 V a.c./d.c. power supplies (which cannot deliver more than 12 V), immersion heaters or nichrome wire, connectors, bimetal strips, thermometers (0–100 °C), use of beakers/cans/calorimeters, measuring cylinders (0–250 ml); if linked to work on microelectronics: components for control circuits including thermistor and relay will also be needed.

Notes

Teachers need to select appropriate activities from this unit. (Some activities overlap and it is not intended that students should do them all.)

Questions Q1 to Q7 are designed provide reading activity for average ability students. Most questions are based on the text. Questions which ask students to *suggest* answers call upon general knowledge.

General information

Medical authorities are concerned by the prevalence of bottle feeding and this unit aims to raise awareness of the nutritional value of human milk in the context of AT 3 in the Science National Curriculum. The emotional benefits of breast feeding are not dealt with in the text, though teachers might wish to add this in discussion.

There is a fairly substantial body of evidence showing that breast fed babies tend to be less overweight, less vulnerable to a wide range of infections, less likely to develop problems with allergies, less likely to die in a cot death and generally healthier than a similar sample of bottle fed babies.

Answers to the questions

Q1 *Baby whales need fat to form blubber. (This is a layer of fat under the skin which provides insulation. Whales are warm-blooded.)*

Q2 *Proteins for growth of rabbits (and humans!).*

Q3 *The baby obtains its energy from carbohydrates – fats and sugar in the case of milk. (It is also possible to use proteins for energy.)*

Q4 *To make it more like human milk.*

Q5 *(a) Contains antibodies.*

(b) The antibodies in cows milk are for the diseases of cattle and, in any case, are destroyed during the processing of infant formula.

Q6 *Ordinary cows milk contains too much casein and the mineral level is far too high.*

Q7 *(a) To kill bacteria.*

(b) To raise it to the same temperature as human milk (although some babies like cold milk).

(c) Bacteria multiply quickly in warm milk and would make the baby ill.

Q8 *(a) % bottle fed: 36, 45, 49, 62, 74, 79, 89. (These figures assume that babies are not being given their milk from a cup or spoon.)*

(b) The time scale may be done in months, a week being taken as one quarter of a month. Students can be encouraged to consider a variety of ways of representing these figures, from graphs to pictures of babies or bottles drawn to scale.

(c) The % of babies breast fed drops and the rate of decline increases with time, or, the rate of change to bottle feeding increases as the baby gets older.

Activity two

A1 Babies were fed on flour and water, gruel, slippery elm (from elm bark) or something similar. Some people added chalk to give the appearance of milk. Needless to say, if a mother could not breast feed her baby it was unlikely to thrive and would probably succumb to disease and die. Rich families would employ a wet nurse, a woman whose baby may have died or, if alive, would be spoon fed on gruel etc. Wet nurses were well looked after to ensure the survival of employers' babies.

A2 Scientific discoveries provided knowledge – the existence of bacteria, killing bacteria by boiling the bottle for 20 minutes and later sterilisation by soaking the bottle in a chemical solution (hypochlorite). This made possible the use of the first plastic bottles which could not be boiled. The use of refrigerators meant that the formula could be made up in advance. The scientific understanding of infant nutrition made it possible to modify cows milk to make it more suitable for young babies.

A3 In a recent survey of 400 Liverpool boys and girls 15 per cent thought breast feeding made people think of 'page 3 girls'. This may explain why only 30 per cent of the city's mothers breast feed their babies at birth, compared with 67 per cent nationally. Dr Jacqueline Gregg, of Sefton General Hospital, writing in the *British Medical Journal* (1989) suggested that because so few of the teenagers were breast fed themselves (only 70 of them) and less than half had ever seen a relation breast feed a baby, schools should take some of the responsibility of trying to educate them not to be embarrassed.

The survey also showed 11 per cent thought breasts

were 'rude' and 8 per cent thought breast feeding was, too. At the same time, three quarters thought breast feeding was 'healthier' than bottle feeding.

Many of the girls interviewed for the survey who expected to breast feed their babies would not consider doing so outside their homes, because of the embarrassment.

A previous survey carried out in 1980 showed the following reasons for women choosing positively either to breast feed or bottle feed their first child.

Reasons given for choosing to breast feed

	%
Best for baby	87
More convenient	38
Breast feeding is natural	26
Closer bond to baby	24
Cheaper	22
Best for mother	8
Can't overfeed baby	3
Influenced by friends	2
Influenced by hospital staff	2
No particular reason	1

Reasons given for choosing not to breast feed

Other people can feed baby	43
Don't like idea of breast feeding	18
Can see how much baby eats	18
No particular reason	10
Other reasons	6
Returning to work soon	5
Persuaded by others	3
Medical reasons	2

The percentages add up to more than 100 as some mothers gave more than one reason. These points may be helpful to aid pupils in their discussions. Interestingly the choice to bottle feed tends to be made on arguments against breast feeding and not for bottle feeding. In contrast, there were very positive choices for breast feeding rather than points against bottle feeding.

Useful sources of further information are local branches of the National Childbirth Trust and the La Leche League (Tel. 071-404 5011 for national headquarters and information sheets in a variety of languages). These do, however, tend to place much more emphasis on the emotional bonding and the practicalities of establishing and maintaining successful breast feeding than the more nutrition-based approach used here.

Part B Bottle feeding in the developing world

Group discussion

Groups of three to five are suitable for discussion work. For further ideas see the General Guide for Teachers and SATIS UPDATE 91.

Bottle feeding continues to put the health of babies at risk in many developing countries. Some people blame the advertising campaigns of the large formula milk companies. The companies promoting infant formulas say it is a mother's own decision whether she choses to use formula milk. When a mother cannot breast feed, it may save the infant's life. However, many mothers (in both developed and developing countries) tend to worry that they have insufficient milk and do not realise how quickly they will lose their milk, if they supplement feeds with formula milk.

Part C

The design brief may be used separately to link with work on quantities of heat, current electricity and control. It provides an opportunity to practice experimental and design skills.

Acknowledgements

Dr. P. Clarke of the DHSS and Gill Fine of the British Nutrition Foundation read and commented on the trial version.

Breast or Bottle?

Part A – Why milk?

Producing babies is what life is all about. All living things create more of their own kind.

Producing offspring is one thing, making sure they survive is another. Mammal mothers produce milk for their young. This gives their offspring a better chance of survival.

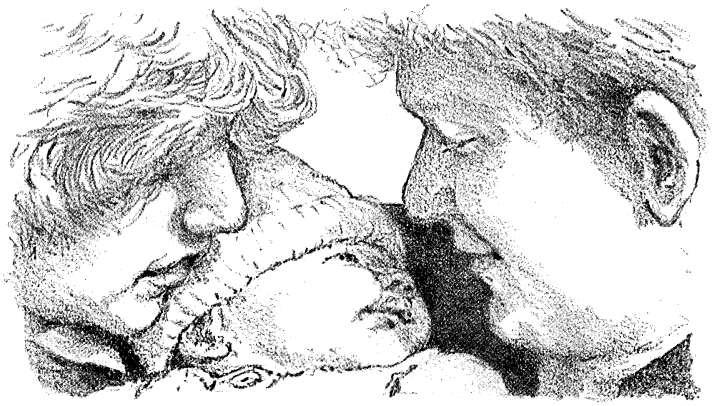
Each type of mammal has milk suited to its own young – the rate at which they grow, the make up of their bodies and many other things. Whale milk is very rich in **fat,** richer than double cream, because baby whales need to form blubber quickly to protect them from the cold. Rabbit milk is high in **protein** (14 %), because baby rabbits grow fast. Donkey milk is similar to human milk.

The following student activities may be selected from this unit.

Part A Why milk?
- answering questions
- producing a comparative table
- data interpretation
- research and discussion
- role-play situations

Part B Bottle feeding in the developing world
- devising a short play
- writing and illustrating a story
- discussion

Part C Design a baby's bottle warmer
- a design brief



Q1 *Whale milk is very rich in fat – why is this important to the survival of baby whales?*

Q2 *Which nutrient is important for the growth of rabbits?*

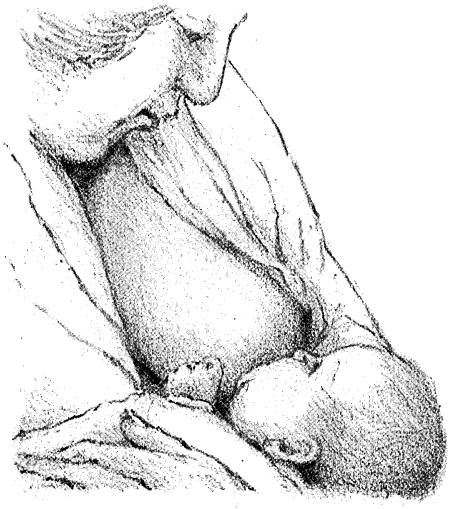
Human mothers, just like any other mammals, produce milk for their newborn babies. Many choose not to use this milk and instead feed their infants on milk of another mammal – the cow. The use of cows milk for human babies has become common only in the last fifty years or so and mainly in the Western world. There are many complicated reasons for this change. But bottle feeding can have advantages – not least, in that fathers can then feed their babies too!

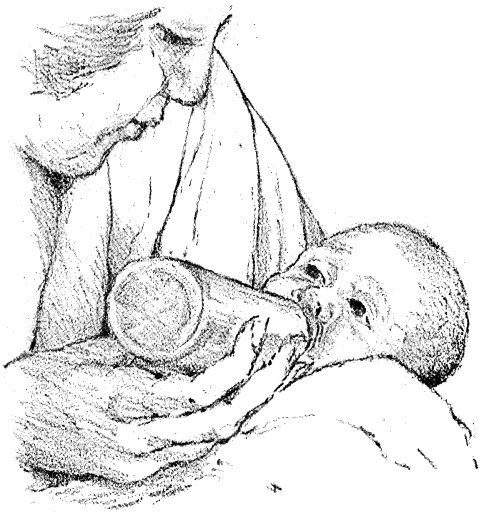
Today cows milk is scientifically modified for human infants and often called 'infant formula'. But is cows milk better than human milk? This unit describes some of the differences between human milk and infant formulas for feeding human babies.

Milk – what's the difference?

Some of the good points about breast milk have been known for a long time. It is germ free and at the right temperature for baby to drink. Other differences between human milk and cows milk have now been discovered.

All milks contain **proteins, sugars (carbohydrate), fat, vitamins, minerals, water,** hormones, enzymes, antibodies and more.





Milk contains a lot of **water.** Cows milk is 88% water, but the amount of water in human milk varies. During the feed, human milk begins by being thin and thirst quenching, becoming more nourishing as the baby feeds. In hot weather a baby needs more fluids and its mother's milk becomes more dilute, responding to its needs.

Human milk contains about 1.2 % **protein** and cows milk has 3.3 % protein. An important protein found in milk is casein and cows milk contains six times more than breast milk. Casein turns into solid curds in a baby's stomach. In infant formula milks the casein is treated to make it more digestible. Some babies are unable to cope with cows milk protein. They are said to suffer from an 'allergy' and may have symptoms such as asthma and eczema. (Such babies may be given special formula milks.)

A special **sugar** found in milk is lactose. Human milk contains much more lactose than cows milk, which makes it taste quite sweet. Extra lactose is now added to formula milks because when it is digested it helps to make the covering for nerve fibres.

Human milk has a higher proportion of **unsaturated fats** than cows milk. Manufacturers of infant formula milks have tried to alter this by adding vegetable oils.

Cows milk has a much higher **mineral content** than human milk. Pure cows milk would put a strain on a small baby's kidneys. Formula milks have been processed to make their mineral content more like human milk.

There is more of **vitamins** A, C, and E in human milk than in cows milk but less vitamin K. Human milk also provides vitamin D. As long as mothers who breast feed have a well balanced diet, their babies should get all the vitamins they need. Bottle fed babies normally obtain enough vitamins from infant formula.

Many **hormones** are found in human milk, several of which are not found at all in cows milk.

Breast milk contains **antibodies** from the mother, giving her baby protection against many different diseases. Of course there are antibodies in cows milk too, but they are against the diseases of cattle and are destroyed by heat during manufacture of formula milks. The protective effect of human milk is very important in areas of the world where you find infections such as cholera and dysentery.

An **enzyme** which also occurs in tears is lysozyme. It is very effective in killing bacteria. There is 300 times more of it in human milk than in cows milk! Fully breast fed babies in Britain almost never get gastroenteritis (sickness and diarrhoea – a very serious condition).

Any drugs, including alcohol, a mother takes while she is pregnant or breast feeding are likely to reach her baby. A mother who is breast feeding should not take medicines before consulting her doctor.

Human milk supplies the needs of human infants perfectly. In spite of this, relatively few British mothers feed their babies solely on breast milk during the first few months of their lives.

Activity one

Produce a table or chart with the information on pages 2 and 3, that compares human milk with cows milk and which could form part of a leaflet given to new parents.

Questions

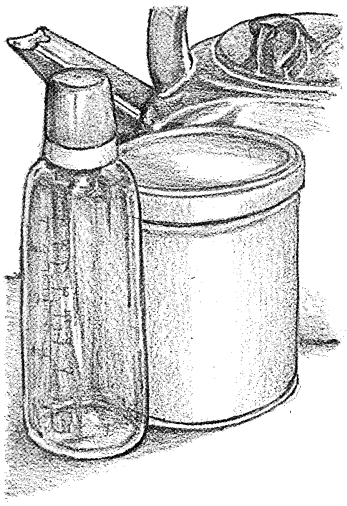
Q3 *Suggest which nutrients in milk provide a baby with energy.*

Q4 *Why is extra lactose (the special milk sugar) added to cows milk in all formula milks?*

Q5 *(a) How does breast milk help to protect a human baby from disease?*
(b) Why does cows milk not give the same sort of protection?

Q6 *Explain why babies should not have ordinary, untreated cows milk until they are at least six months old.*

Q7 *Suggest why*
(a) a baby's bottle should be sterilised before use,
(b) many parents warm the milk in their baby's bottle,
(c) milk in babies' bottles should not be kept warm for long periods of time, but heated up when needed.



How many babies are breast fed or bottle fed? The table below shows the percentage of babies being breast fed in Great Britain in 1985.

Table 1 Percentage of mothers breast feeding in Great Britain in 1985

Age of baby	% breast fed	% bottle fed
Birth	64	
1 week	55	
2 weeks	51	
6 weeks	38	
4 months	26	
6 months	21	
9 months	11	

Q8 *(a) Copy table 1. Find the percentage of bottle fed babies.*
(b) Draw a graph or chart of these figures that helps to explain them in an interesting way.
(c) What do the figures tell you about breast feeding and bottle feeding?

Activity two

Find out about and discuss in groups

A1 What happened to babies who could not be breast fed before bottle feeding became a safe alternative? What were wet nurses?

A2 What developments for sterilising bottles, storing and warming milk have made bottle feeding safer and easier today?

A3 The World Health Organisation recommends that all babies should be breast fed for at least a year. Many women in the West do not try to breast feed, or they change to bottle feeding very quickly. Give reasons why you think this may be so.

Activity three – situations

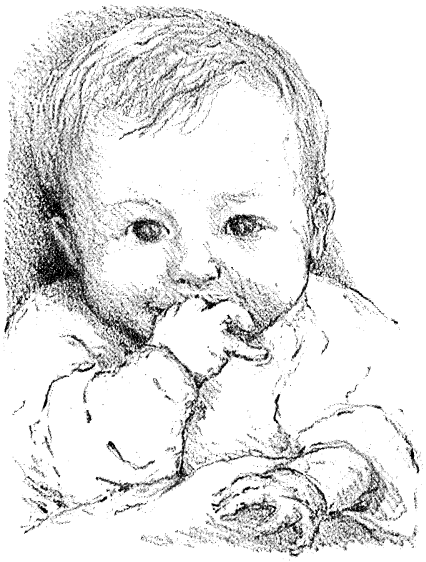
Consider the point of view of somebody in one of these situations. Take a few minutes to jot down the advantages of your point of view. You might like to try acting out the scene.

Scene one

A: You are a mother-to-be who is not keen on breast feeding.
B: You are her doctor.

Scene two

A: You are a father-to-be whose wife intends to bottle feed.
B: You are A's father. You are trying to convince your son, who was breast fed, of the benefits of breast feeding.



Scene three

A: You are a mother who wants to return to work and continue to breast feed your baby.
B: You are her employer.

Scene four

A: You are a mother-to-be who wants to breast feed.
B: You are the father-to-be who feels it might be embarrassing.
C: You are a family friend/older sister/mother who favours breast feeding.

Scene five

A: You are a mother-to-be and want to put your baby on the bottle so that you may return to work.
B: You are the father-to-be who thinks the baby should be breast fed if possible.

Scene six

A: You are a breast feeding mother out shopping in a department store whose baby is crying with hunger.
B: You are a shop assistant.

Scene seven

A: You are on holiday with your husband in a remote part of Morocco where bottle feeding is unknown. You have a baby six months old which you have left at home with your mother. You show a picture of your baby to the tour guide.
B: You are a local tour guide. You have never heard of bottle feeding. All babies where you live are breast fed well into their second year. You want to know how the grandmother feeds the baby.

Part B – Bottle feeding in the developing world

Sarah lives with her in-laws in a remote village in a developing country. She has a young baby which she bottle feeds. This is how she goes about it.

- Fetch firewood and make a fire.
- Fetch water from a dirty barrel or polluted pond.
- Use precious fuel to boil the bottle for 10 minutes to sterilise it.
- Find a clean surface on which to prepare the feed.
- Work out what the instructions on the label say – not easy, because she cannot read.
- Boil more water and make up feed. (Remember that it is very expensive but try to resist the temptation to dilute it more than the instructions say to save money.)
- Cool the mixture. (Resist the temptation to pour it into an unsterilised cold container.)
- Feed baby.
- Throw away any leftover feed. (Baby formula is so expensive that she is tempted to keep any leftover for another feed.)

Sarah does this several times a day, using up precious firewood, without a refrigerator to store made up formula and without being able to afford chemicals for sterilisation.

Answers to questions are in the *Teachers' Notes.*

During the 1970s formula milks were widely promoted in developing nations. New mothers frequently received free samples as part of advertising campaigns as did hospitals and doctors. Many mothers tried out the formula milks on their babies. But when the free sample was finished they found that their own milk had gone. (Once a mother stops breast feeding her body quickly adjusts and she soon loses her milk.)

Health workers became concerned when babies began suffering from malnutrition and disease in some areas. They found many mothers had stopped breast feeding.

Some countries decided to educate parents in the advantages of breast feeding. And others took further action. In Sri Lanka, no mother was permitted to bottle feed in hospital without a doctor's permission. In Papua New Guinea, feeding bottles and teats were put on prescription and in Micronesia, school children had to calculate the cost of bottle feeding for a year.

Breast feeding has another advantage too – it inhibits ovulation; a mother who is breast feeding is less likely to become pregnant.

However, many mothers have to work to support their families and cannot take their babies with them. 'Western' formula milk may appear an attractive option.

Activity four

Devise a short play about Sarah with the following characters:
Sarah,
her mother-in-law,
her husband.
You may add more characters if you wish.

Activity five

Write and illustrate a story for primary school children which describes how Sarah prepares her baby's bottle.

Questions for group discussion

- *Should free samples of formula milk be given to new mothers?*
- *What should large milk companies do to improve the health of babies in developing countries?*
- *Should the advertising of formula milks be banned or restricted?*

Part C

ParentCare
TravelBabe

You are a member of the ParentCare™ plc design team. A new product you are working on is the TravelBabe: a heater to warm a baby's bottle of milk in a car, using the car's dashboard lighter socket (which supplies 12 volts d.c.) as a power source.

- **You are to design the heater.**
- **Make and test a prototype, finding out how long it takes to heat up the milk to the correct temperature.**

Activity six – Design a baby's bottle warmer

1 Produce a design proposal for the product, including an estimate of

- ☐ how much milk will be heated,
- ☐ what the temperature rise should be.

2 Draw a sketch of the baby's bottle warmer as it might finally look.

3 Draw a diagram or sketch of how you would make a working prototype in the laboratory, using the sort of equipment that you are used to. Make a list of everything you will need.

4 Draw a circuit diagram showing how you would connect up the heater to make it work. Get your plans checked by your teacher.

5 Make your prototype.

6 Test it to see if it performs to your original specification. (Decide what measurements you will need to take before you start.)

7 Did your prototype meet its design specifications? If not, suggest ways of improving the design.