FLOTAC®

Veterinary Parasitology and Parasitic Diseases
Department of Pathology and Animal Health
Faculty of Veterinary Medicine, University of Naples Federico II
Via della Veterinaria, 1 - 80137 Naples, Italy
www.flotac.unina.it - www.parassitologia.unina.it

The FLOTAC Manual is divided into two parts:
The first part describes (a) basic principles; (b) components; (c) accessories; (d) assembly; and (e) positions and steps of the FLOTAC®.

The second part of the Manual describes the Flotac techniques, i.e., the Flotac basic technique, the Flotac dual technique, the Flotac double technique, and the Flotac faecal egg count calibration.

Flotation solutions (**FS**) play a fundamental role in determining the sensitivity, precision and accuracy of any copromicroscopic technique (qualitative and/or quantitative) based upon flotation. The key role of **FS** is further discussed in the Flotac faecal egg count calibration section of the second part of the Manual.

Flotac techniques augment the efficiency of the various **FS** with respect to clarity of reading, sensitivity, flotation of numbers of parasitic elements, precision and accuracy; but they also augment the negative aspects of some **FS** regarding turbidity of reading, floating of small and large faecal debris, etc. As a consequence, not all the **FS** used in parasitological labs can be used with the Flotac techniques.

The section **Flotation solutions** of the Manual and of this **APPENDIX** reports the chemical composition of the 9 **FS** that give the best results using the Flotac techniques with respect to the clarity of reading, sensitivity, precision and accuracy.

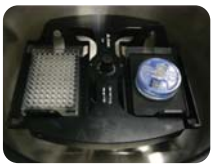
The WORK TABLES in this APPENDIX report the classification of 9 FS for the most common parasitic elements eliminated with faeces from cattle, buffaloes, sheep and goats.

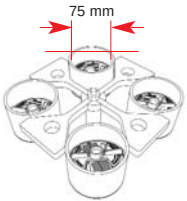
The Flotac techniques are designed for use by researchers, and all laboratory technicians who need highly accurate and precise results, where such results are more important than the simplicity or cost of the technique chosen.

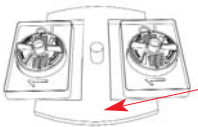
It is our fond hope that the use of the Flotac techniques will help the advancement of knowledge in the fields of human and veterinary parasitology.

Prof. Giuseppe Cringoli

LABORATORY EQUIPMENT REQUIRED FOR THE FLOTAC TECHNIQUES





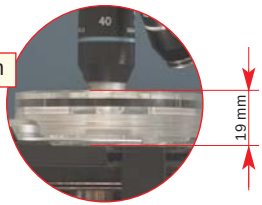


CENTRIFUGE

a) Large volume centrifuge
(with buckets of at least 75 mm diameter)

or

b) Benchtop centrifuge with
rotor for microtitre plates



MICROSCOPE

Conventional optical microscope with a travel range of at least 25 mm (FLOTAC® is 19 mm high)


∞/0.17/D
HCX PL FLUOTAR
40x/0.75
20x

Flotation Solutions

Flotation solutions play a key role in determining the sensitivity, precision and accuracy of any copromicroscopic technique (qualitative and/or quantitative) based upon flotation.

Among the 14 flotation solutions listed in the paper by Cringoli et al. (Vet Parasitol 2004, 123: 121- 131), the following 9 flotation solutions give the best results with the Flotac techniques with respect to clarity of reading, sensitivity, precision and accuracy.

FLOTATION SOLUTIONS

Flotation solutions		Specific gravity (s.g.)
FS 1	Sheather's Sugar Solution	1.200
FS 2	Satured Sodium Chloride	1.200
FS 3	Zinc Sulphate 1.200	1.200
FS 4	Sodium Nitrate	1.200
FS 5	Sucrose and Potassium Iodomercurate (Rinaldi)	1.250
FS 6	Magnesium Sulphate	1.280
FS 7	Zinc Sulphate 1.350	1.350
FS 8	Potassium Iodomercurate	1.440
FS 9	Zinc Sulphate and Potassium Iodomercurate (Tampieri - Restani)	1.450

FS 1 - Sheather's Sugar Solution (s.g. - 1.200)

1 - Combine 355 ml of water and 454 grams of granulated sugar (sucrose). Corn syrup and dextrose are not suitable substitutes.
2 - Dissolve the sugar in the water by stirring on a magnetic stirrer over low or indirect heat (e.g., the top half of a double boiler). If the container is placed on a high direct heat source, the sugar may caramelize instead of dissolving in the water.
3 - After the sugar is dissolved and the solution has cooled to room temperature, add 6 ml of formaldehyde (40%) USP to prevent microbial growth.
4 - Check the s.g. with a hydrometer.

FS 2 - Satured Sodium Chloride (NaCl, s.g. - 1.200)

1 - Combine 1000 ml of warm water and about 500 grams of salt until no more salt goes into solution and the excess settles on the bottom of the container.
2 - Dissolve the salt in the water by stirring on a magnetic stirrer.
3 - To ensure that the solution is fully saturated, it should be allowed to stand overnight at room temperature. If the remaining salt crystals dissolve overnight, more can be added to ensure that the solution is saturated.
4 - Check the s.g. with a hydrometer, recognizing that the s.g. of saturated solution will vary slightly with environmental temperature.

FS 3 – Zinc Sulphate (ZnSO4-7H2O, s.g. - 1.200)

1 - Combine 500 ml of water and 330 grams of zinc sulphate.
2 - Dissolve the zinc sulphate in the water by stirring on a magnetic stirrer.
3 - Add water to reach a final volume of 1000 ml.
4 - Check the s.g. with a hydrometer.

FS 4 – Sodium Nitrate ($NaNO_3$, s.g. - 1.200)

1 - Combine 500 ml of water and 315 grams of sodium nitrate.
2 - Dissolve the sodium nitrate in the water by stirring on a magnetic stirrer.
3 - Add water to reach a final volume of 1000 ml.
4 - Check the s.g. with a hydrometer.

FS 5 – Sucrose and Potassium Iodomercurate (Rinaldi) (s.g. 1.250)

1 - Combine 600 ml of water and 600 grams of sucrose.
2 - Dissolve the sugar in the water by stirring on a magnetic stirrer over low or indirect heat (e.g., the top half of a double boiler). If the container is placed on a high direct heat source, the sugar may caramelize instead of dissolving in the water.
3 - After the sugar is dissolved and the solution has cooled to room temperature, add 20 ml of solution B (see below).
4 - Check the s.g. with a hydrometer.

Solution B

1 - Combine 100 grams of mercure iodide and 63 ml of water.
2 - Stir vigorously.
3 - Add 78 grams of potassium iodide and stir again.

FS 6 – Magnesium Sulphate ($MgSO_4$, s.g. - 1.280)

1 - Combine 500 ml of water and 350 grams of magnesium sulphate.
2 - Dissolve the magnesium sulphate in the water by stirring on a magnetic stirrer.
3 - Add water to reach a final volume of 1000 ml.
4 - Check the s.g. with a hydrometer.

FS 7 – Zinc Sulphate (ZnSO4-7H2O, s.g. - 1.350)

1 - Combine 685 ml of water and 685 grams of zinc sulphate.
2 - Dissolve the zinc sulphate in the water by stirring on a magnetic stirrer.
3 - Check the s.g. with a hydrometer.

FS 8 – Potassium Iodomercurate (s.g. - 1.440)

1 - Combine 399 ml of water and 150 grams of mercure iodide.
2 - Stir vigorously.
3 - Add 111 grams of potassium iodide and stir again.
4 - Check the s.g. with a hydrometer.

FS 9 – Zinc Sulphate and Potassium Iodomercurate (Tampieri - Restani) (s.g. - 1.450)

1 - Combine 600 ml of water and 600 grams of zinc sulphate (ZnSO4-7H2O).
2 - Dissolve the zinc sulphate in the water by stirring on a magnetic stirrer.
3 - After the zinc sulphate is dissolved add the solution B (see below).
4 - Check the s.g. with a hydrometer.

Solution B

1 - Combine 100 grams of mercure iodide and 63 ml of water.
2 - Stir vigorously.
3 - Add 78 grams of potassium iodide and stir again.

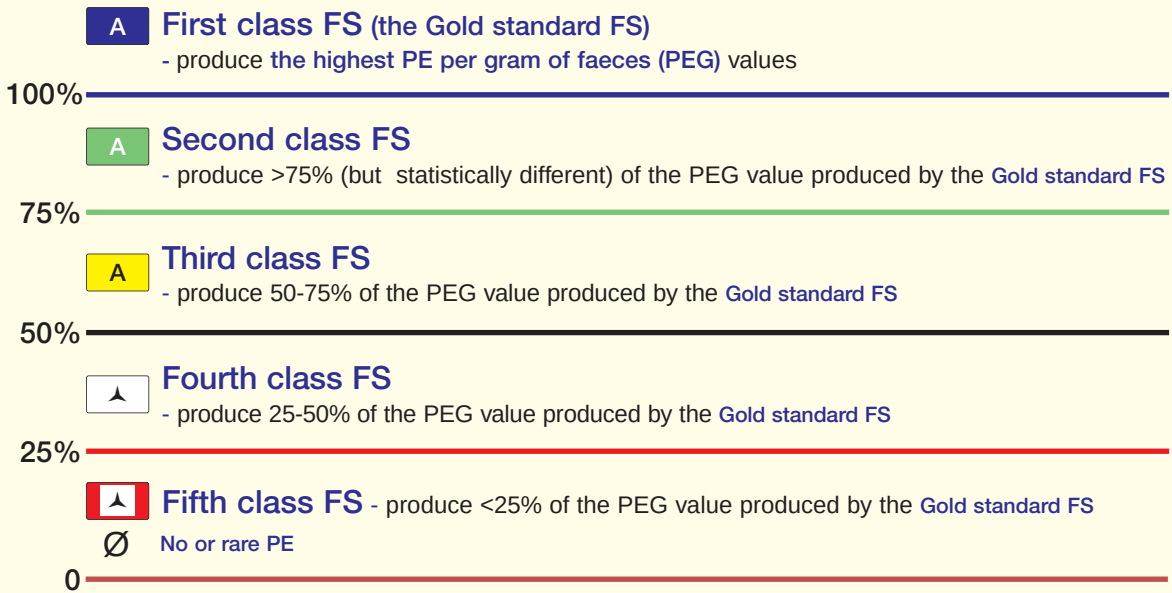
Flotac faecal egg count calibration and flotation solutions cassification

In the WORK TABLES reported in this APPENDIX for the parasitic elements (PE = eggs, larvae, oocysts, cysts) most frequently found in faeces from sheep, goats, cattle, and buffaloes, 9 flotation solutions (FS) divided into different classes (based on their efficiency) are reported.

The contents of the following WORK TABLES are the results of a series of Flotac faecal egg count calibrations (see Flotac Manual pg. 67) performed per each PE, utilizing composite faecal samples (both from grazing and housing animals), and utilizing four different methods of faecal preservation: fresh faeces, fixed in formalin 5%, fixed in formalin 10%, and frozen (see the scheme on page 17).

The classification of these results with respect to the efficiency of FS take into consideration both the 4 faecal preservation methods and the 9 FS within each faecal preservation method.

FLOTATION SOLUTIONS CLASSIFICATION



Coefficent of variation

Moreover, for each **FS** that produce PEG values above 50% of the value produced by the **Gold standard FS**, a letter indicates the respective coefficient of variation [CV = (standard deviation/PEG mean value resulting from 6 replicates) x 100] that represents the precision of the technique:

(E) CV above 20%
(D) CV between 15% and 20%
(C) CV between 10% and 15%
(B) CV between 5% and 10%
(A) CV below 5%

The lower the CV is, the more precise is the technique; **CV values below 5% are advisable**.

The FS that produce PEG value below 50% of the value produced by the **Gold standard FS** are marked with (⅄). In addition the FS that produce PEG value of 0 (or rare PE) are marked with (Ø)

Each laboratory should have at least two **FS** for each PE of interest: a first choice **FS** and a second choice **FS**. The first choice - the **Gold standard** - **FS** are particularly recommended for research or diagnosis using the Flotac basic technique or the Flotac double technique when the faecal samples contain PE from a single parasitic species (natural or experimental mono-infection), or when the faecal samples contain different PE having the same behaviour with respect to the **FS** used.

The second and the third classes **FS,** are particularly useful for diagnosis used in parallel with the **Gold standard FS** and/or other classes **FS** on the same faecal sample with the Flotac dual technique in order to perform a wide parasitological screening on different PE. If necessary, also the subsequent classes of **FS** may be used.

FLOTATION SOLUTIONS CLASSIFICATION

In diagnostic practice, a wide range of herbivorous alimentation types (which can produce undesirable residues in the faeces) may influence the clarity of reading with some of the 9 **FS**. At step n. 5 of the Flotac techniques (i.e., transfer into a tube), it is advisable to prepare an extra pellet. In case the **FS** used has a low clarity of reading due to the flotation of a large amount of debris, the technique can be repeated utilizing the other pellet with another compatible **FS**.

The following section contains:

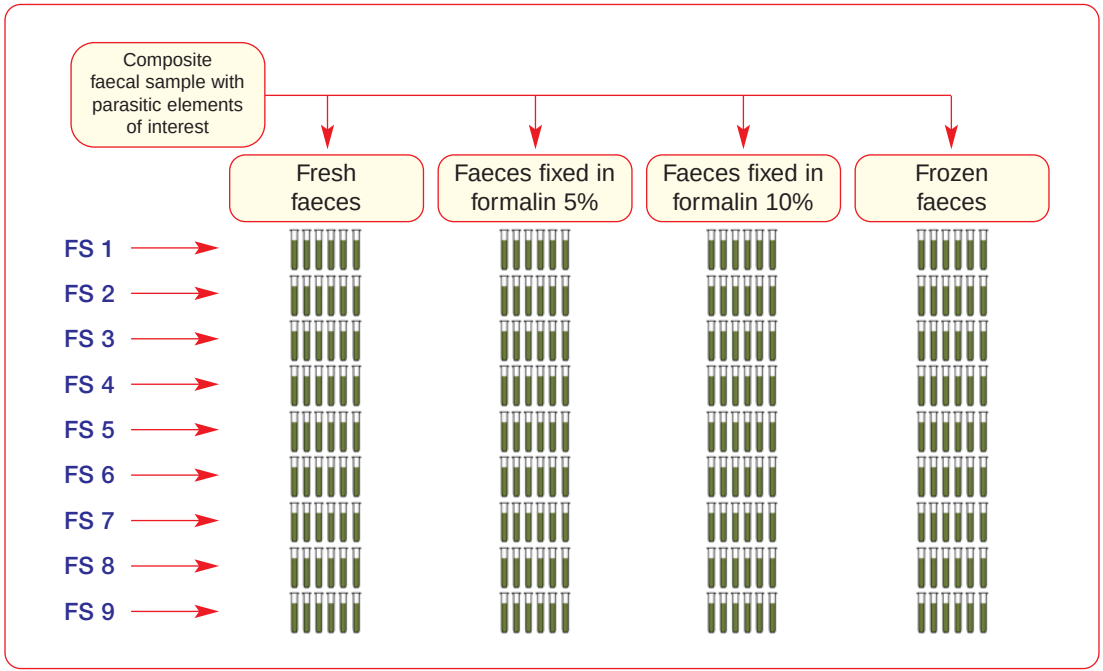
a) **The Flotac faecal egg count calibration (FFECC) scheme** which was used for each parasitic element reported in the **WORK TABLES** (pg. 17) .

b) Four bar charts which show the results of the FFECC referred to GI strongyles in sheep for each faecal preservation method: an example of **FS CLASSIFICATION**. For each FS, the symbols corresponding to the classes of **FS** in the **WORK TABLES** are also reported above each chart (pgs 18 - 19).

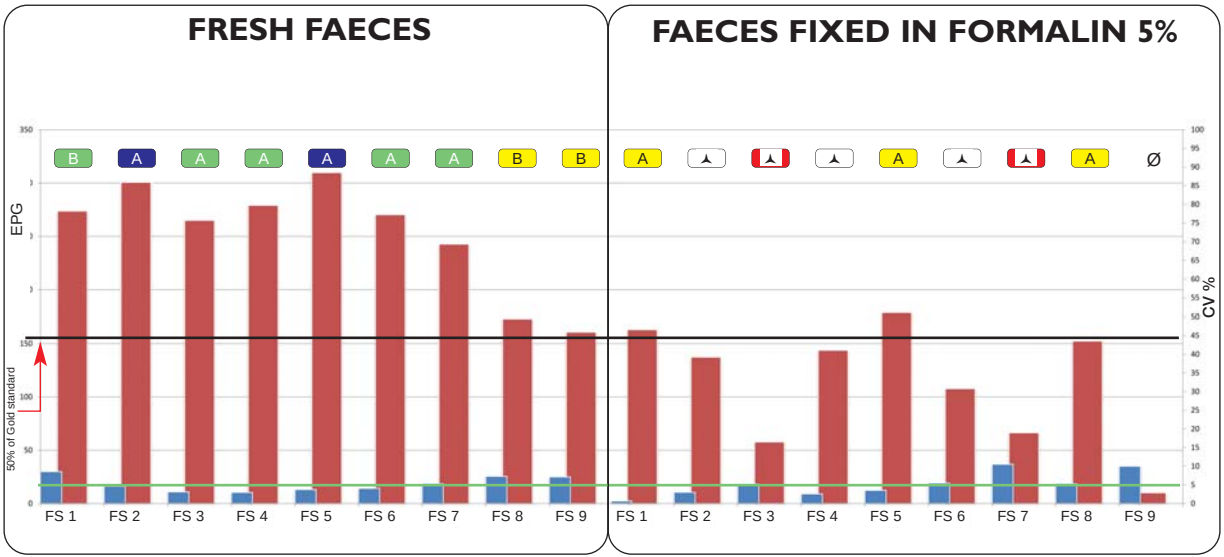
c) A planning which shows the overall results of the FFECC for GI strongyles in sheep: an example of **FS CLASSIFICATION** (pg. 20).

d) The **WORK TABLES** which show, for each faecal preservation method, the results of the FFECC performed for the most common parasitic elements eliminated with the faeces from herbivores (pgs 22 - 31).

Flotac faecal egg count calibration scheme



Bar plot of results of Flotac faecael egg counts calibration of sheep



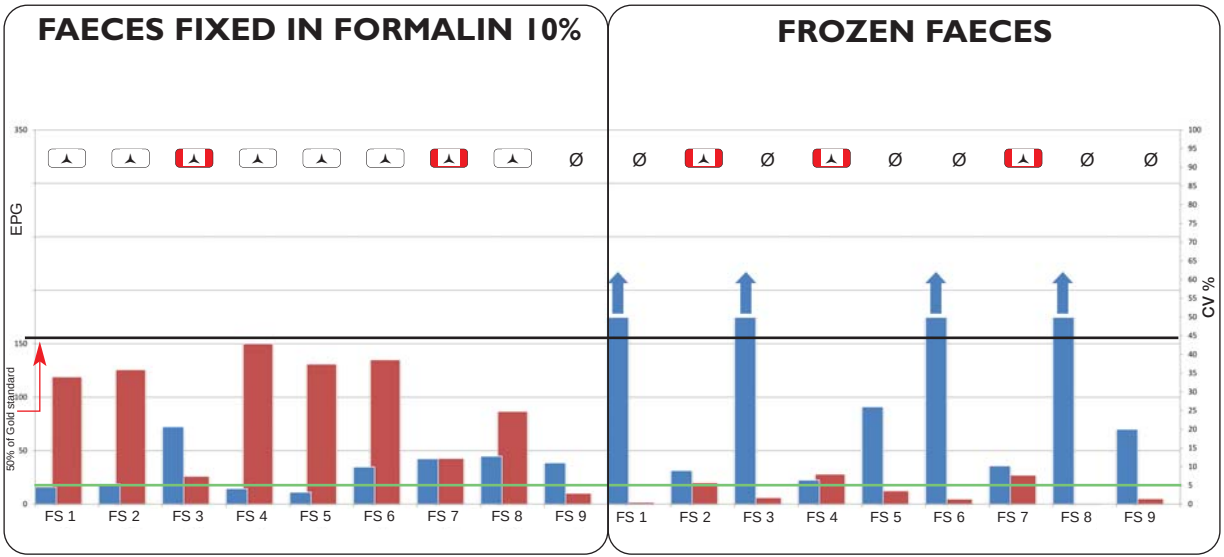
Mean number (derived from 6 replicates) of eggs per gram of faeces

Coefficient of Variation (CV) = (standard deviation / mean PEG) x 100

50% of Gold standard PEG

CV below 5% (optimal)

gastrointestinal nematode: an example of FS CLASSIFICATION

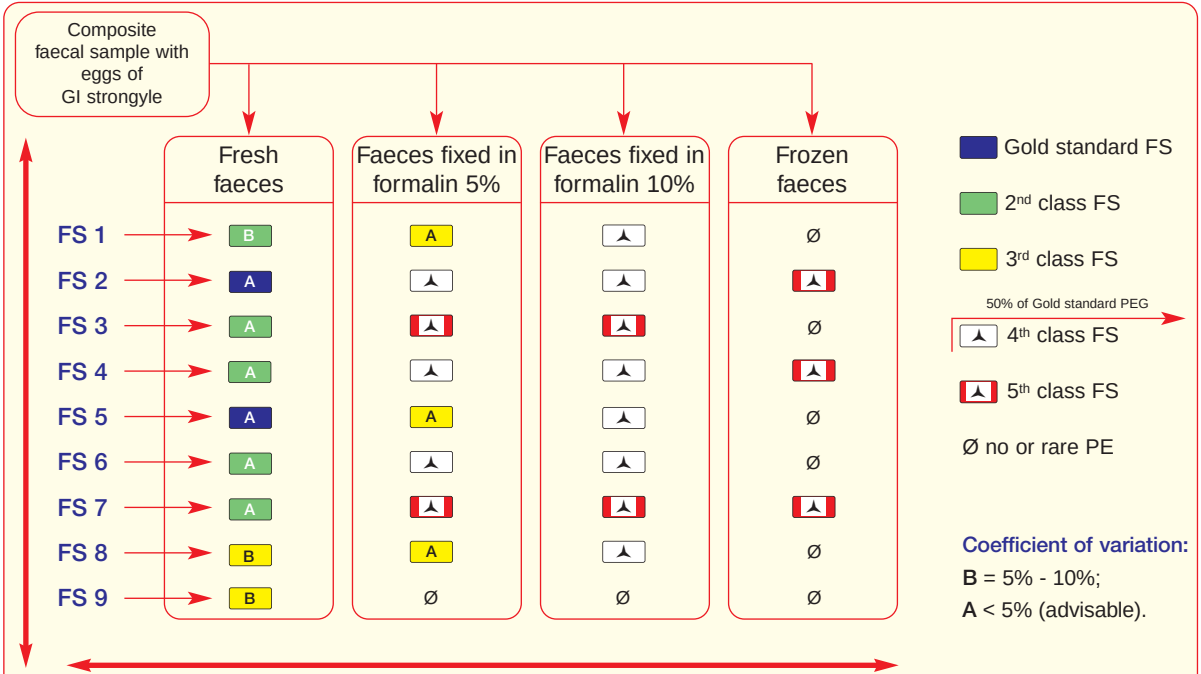


50% of Gold standard PEG

Gold standard FS | 2nd class FS | 3rd class FS | 4th class FS | 5th class FS | Ø no or rare PE

CV = **A** < 5% (advisable); **B** = 5% - 10%.

Sheep - Flotac faecal egg count calibration on Gastrointestinal strongyle eggs



The classification of these results with respect to the efficiency of FS take into consideration both the 4 faecal preservation methods and the 9 FS within each faecal preservation method.

sheep and goats

WORK TABLES

SHEEP AND GOATS — FRESH FAECES

Parasitic elements		Flotation solutions (FS) of choice and specific gravity								
		FS 1	FS 2	FS 3	FS 4	FS 5	FS 6	FS 7	FS 8	FS 9
		1.200	1.200	1.200	1.200	1.250	1.280	1.350	1.440	1.450
Oocysts	Eimeria					B	B			Ø
Eggs	GI strongyles	B	A	A	A	A	A	A	B	B
	Moniezia	B	A	A	B	B	A	B	A	C
	Fasciola	Ø	Ø	Ø	Ø	Ø	Ø	A		B
	Paramphistomum	Ø	Ø	Ø	Ø	Ø	Ø	C	C	C
	Dicrocoelium	Ø	Ø	Ø	Ø	Ø	Ø	A	A	A
Larvae (L1)	Lungworms	Ø	Ø	A	Ø	Ø		B		A

- Gold standard FS
- 2nd class FS
- 3rd class FS
- 4th class FS
- 5th class FS

Ø no or rare parasitic elements

Coefficient of variation

D = 15% - 20%;
C = 10% - 15%;
B = 5% - 10%;
A < 5% (advisable).

SHEEP AND GOATS **FRESH FAECES**

Flotac dual technique: FS combination and minimum PE detectable

1st combination suggested

FS 5	FS 9
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Muellerius Cystocaulus Protostrongylus Neostongylus Dictyocaulus

2nd combination suggested

FS 2	FS 7
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Muellerius Cystocaulus Protostrongylus Neostongylus Dictyocaulus

SHEEP AND GOATS — FAECES FIXED IN FORMALIN 5%

Parasitic elements		Flotation solutions (FS) of choice and specific gravity								
		FS 1	FS 2	FS 3	FS 4	FS 5	FS 6	FS 7	FS 8	FS 9
		1.200	1.200	1.200	1.200	1.250	1.280	1.350	1.440	1.450
Oocysts	Eimeria	D	4th	Ø	5th	4th	4th	5th	5th	Ø
Eggs	GI strongyles	A	4th	5th	4th	A	4th	5th	A	Ø
	Moniezia	B	A	A	4th	A	C	B	B	B
	Fasciola	Ø	Ø	Ø	Ø	Ø	Ø	B	4th	A
	Paramphistomum	Ø	Ø	Ø	Ø	Ø	Ø	4th	E	A
	Dicrocoelium	Ø	Ø	Ø	Ø	Ø	Ø	A	A	A
Larvae (L1)	Lungworms	5th	Ø	B	Ø	4th	4th	A	5th	C

- Gold standard FS
- 2nd class FS
- 3rd class FS
- 4th class FS
- 5th class FS
- Ø no or rare parasitic elements

Coefficient of variation

E > 20%
D = 15% - 20%;
C = 10% - 15%;
B = 5% - 10%;
A < 5% (advisable).

SHEEP AND GOATS **FAECES FIXED IN FORMALIN 5%**

Flotac dual technique: FS combination and minimum PE detectable

1st combination suggested

FS 1	FS 9
Eimeria	Fasciola
GI strongyles	Paramphistomum
Moniezia	Dicrocoelium
	Muellerius
	Cystocaulus
	Protostrongylus
	Neostongylus
	Dictyocaulus

2nd combination suggested

FS 1	FS 7
Eimeria	Fasciola
GI strongyles	Paramphistomum
Moniezia	Dicrocoelium
	Muellerius
	Cystocaulus
	Protostrongylus
	Neostongylus
	Dictyocaulus

SHEEP AND GOATS — FAECES FIXED IN FORMALIN 10%

Parasitic elements		Flotation solutions (FS) of choice and specific gravity								
		FS 1	FS 2	FS 3	FS 4	FS 5	FS 6	FS 7	FS 8	FS 9
		1.200	1.200	1.200	1.200	1.250	1.280	1.350	1.440	1.450
Oocysts	Eimeria	5th	5th	Ø	5th	4th	Ø	Ø	5th	Ø
Eggs	GI strongyles	4th	4th	5th	4th	4th	4th	5th	4th	Ø
	Moniezia	B	A	B	B	A	B	B	C	B
	Fasciola	Ø	Ø	Ø	Ø	Ø	Ø	4th	4th	E
	Paramphistomum	Ø	Ø	Ø	Ø	Ø	Ø	4th	4th	E
	Dicrocoelium	Ø	Ø	Ø	Ø	Ø	5th	5th	B	4th
Larvae (L1)	Lungworms	5th	Ø	4th	Ø	Ø	4th	4th	Ø	B

- Gold standard FS
- 2nd class FS
- 3rd class FS
- 4th class FS
- 5th class FS

Ø no or rare parasitic elements

Coefficient of variation

E > 20%
D = 15% - 20%;
C = 10% - 15%;
B = 5% - 10%;
A < 5% (advisable).

SHEEP AND GOATS **FAECES FIXED IN FORMALIN 10%**

Flotac dual technique: FS combination and minimum PE detectable

1st combination suggested

FS 5	FS 9
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Muellerius Cystocaulus Protostrongylus Neostongylus Dictyocaulus

2nd combination suggested

FS 2	FS 7
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Muellerius Cystocaulus Protostrongylus Neostongylus Dictyocaulus

SHEEP AND GOATS — FROZEN FAECES

Parasitic elements		Flotation solutions (FS) of choice and specific gravity								
		FS 1	FS 2	FS 3	FS 4	FS 5	FS 6	FS 7	FS 8	FS 9
		1.200	1.200	1.200	1.200	1.250	1.280	1.350	1.440	1.450
Oocysts	Eimeria	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
Eggs	GI strongyles	Ø	5th	Ø	5th	Ø	Ø	5th	Ø	Ø
	Moniezia	B	B	B	B	B	B	B	B	A
	Fasciola	Ø	Ø	Ø	Ø	Ø	Ø	4th	4th	A
	Paramphistomum	Ø	Ø	Ø	Ø	Ø	Ø	4th	C	B
	Dicrocoelium	Ø	Ø	Ø	Ø	Ø	5th	5th	A	A
Larvae (L1)	Lungworms	Ø	Ø	B	Ø	Ø	5th	4th	5th	B

- Gold standard FS
- 2nd class FS
- 3rd class FS
- 4th class FS
- 5th class FS
- Ø no or rare parasitic elements

Coefficient of variation

D = 15% - 20%;
C = 10% - 15%;
B = 5% - 10%;
A < 5% (advisable).

SHEEP AND GOATS **FROZEN FAECES**

Flotac dual technique: FS combination and minimum PE detectable

1st combination suggested

FS 2	FS 9
Eimeria GI strongyles	Moniezia Fasciola Paramphistomum Dicrocoelium Muellerius Cystocaulus Protostrongylus Neostongylus Dictyocaulus

2nd combination suggested

FS 2	FS 7
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Muellerius Cystocaulus Protostrongylus Neostongylus Dictyocaulus

cattle and buffaloes

WORK TABLES

CATTLE AND BUFFALOES — FRESH FAECES

Parasitic elements		Flotation solutions (FS) of choice and specific gravity								
		FS 1	FS 2	FS 3	FS 4	FS 5	FS 6	FS 7	FS 8	FS 9
		1.200	1.200	1.200	1.200	1.250	1.280	1.350	1.440	1.450
Oocysts	Eimeria	4th	E	5th	Ø	E	E	5th	5th	E
Eggs	GI strongyles	B	E	C	E	C	E	E	4th	5th
	Moniezia	D	E	E	E	E	E	E	4th	D
	Fasciola	Ø	Ø	Ø	Ø	Ø	Ø	A	4th	B
	Paramphistomum	Ø	Ø	Ø	Ø	Ø	Ø	C	C	C
	Dicrocoelium	Ø	Ø	Ø	Ø	Ø	Ø	A	A	A
Larvae (L1)	Lungworms	Ø	Ø	A	Ø	Ø	5th	B	4th	A

- Gold standard FS
- 2nd class FS
- 3rd class FS
- 4th class FS
- 5th class FS
- Ø no or rare parasitic elements

Coefficient of variation

E > 20%
D = 15% - 20%;
C = 10% - 15%;
B = 5% - 10%;
A < 5% (advisable).

CATTLE AND BUFFALOES **FRESH FAECES**

Flotac dual technique: FS combination and minimum PE detectable

1st combination suggested

FS 5	FS 7
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Dictyocaulus

2nd combination suggested

FS 1	FS 7
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Dictyocaulus

CATTLE AND BUFFALOES — FAECES FIXED IN FORMALIN 5%

Parasitic elements		Flotation solutions (FS) of choice and specific gravity								
		FS 1	FS 2	FS 3	FS 4	FS 5	FS 6	FS 7	FS 8	FS 9
		1.200	1.200	1.200	1.200	1.250	1.280	1.350	1.440	1.450
Oocysts	Eimeria	5th	5th	Ø	Ø	4th	Ø	Ø	5th	5th
Eggs	GI strongyles	4th	5th	5th	5th	4th	4th	5th	4th	Ø
	Moniezia	E	4th	E	4th	4th	4th	4th	4th	D
	Fasciola	Ø	Ø	Ø	Ø	Ø	Ø	B	4th	A
	Paramphistomum	Ø	Ø	Ø	Ø	Ø	Ø	4th	E	A
	Dicrocoelium	Ø	Ø	Ø	Ø	Ø	Ø	A	A	A
Larvae (L1)	Lungworms	5th	Ø	B	Ø	4th	4th	A	5th	C

- Gold standard FS
- 2nd class FS
- 3rd class FS
- 4th class FS
- 5th class FS

Ø no or rare parasitic elements

Coefficient of variation

E > 20%
D = 15% - 20%;
C = 10% - 15%;
B = 5% - 10%;
A < 5% (advisable).

CATTLE AND BUFFALOES **FAECES FIXED IN FORMALIN 5%**

Flotac dual technique: FS combination and minimum PE detectable

1st combination suggested

FS 5	FS 9
Eimeria GI strongyles	Moniezia Fasciola Paramphistomum Dicrocoelium Dictyocaulus

2nd combination suggested

FS 1	FS 7
Eimeria GI strongyles	Moniezia Fasciola Paramphistomum Dicrocoelium Dictyocaulus

CATTLE AND BUFFALOES — FAECES FIXED IN FORMALIN 10%

Parasitic elements		Flotation solutions (FS) of choice and specific gravity								
		FS 1	FS 2	FS 3	FS 4	FS 5	FS 6	FS 7	FS 8	FS 9
		1.200	1.200	1.200	1.200	1.250	1.280	1.350	1.440	1.450
Oocysts	Eimeria	5th	Ø	Ø	Ø	4th	5th	Ø	5th	Ø
Eggs	GI strongyles	4th	5th	5th	4th	4th	5th	Ø	5th	Ø
	Moniezia	4th	4th	4th	4th	D	4th	4th	4th	4th
	Fasciola	Ø	Ø	Ø	Ø	Ø	Ø	4th	4th	E
	Paramphistomum	Ø	Ø	Ø	Ø	Ø	Ø	4th	4th	E
	Dicrocoelium	Ø	Ø	Ø	Ø	Ø	5th	5th	B	4th
Larvae (L1)	Lungworms	5th	Ø	4th	Ø	Ø	4th	4th	Ø	B

- Gold standard FS
- 2nd class FS
- 3rd class FS
- 4th class FS
- 5th class FS
- Ø no or rare parasitic elements

Coefficient of variation

E > 20%
D = 15% - 20%;
C = 10% - 15%;
B = 5% - 10%;
A < 5% (advisable).

CATTLE AND BUFFALOES **FAECES FIXED IN FORMALIN 10%**

Flotac dual technique: FS combination and minimum PE detectable

1st combination suggested

FS 5	FS 9
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Dictyocaulus

2nd combination suggested

FS 1	FS 7
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Dictyocaulus

CATTLE AND BUFFALOES — FROZEN FAECES

Parasitic elements		Flotation solutions (FS) of choice and specific gravity								
		FS 1	FS 2	FS 3	FS 4	FS 5	FS 6	FS 7	FS 8	FS 9
		1.200	1.200	1.200	1.200	1.250	1.280	1.350	1.440	1.450
Oocysts	Eimeria	4th	5th	5th	5th	4th	4th	5th	4th	Ø
Eggs	GI strongyles	Ø	5th	Ø	5th	Ø	Ø	Ø	5th	Ø
	Moniezia	4th	4th	E	E	4th	4th	4th	4th	4th
	Fasciola	Ø	Ø	Ø	Ø	Ø	Ø	4th	4th	A
	Paramphistomum	Ø	Ø	Ø	Ø	Ø	Ø	4th	C	B
	Dicrocoelium	Ø	Ø	Ø	Ø	Ø	5th	5th	A	A
Larvae (L1)	Lungworms	Ø	Ø	B	Ø	Ø	5th	4th	5th	B

- Gold standard FS
- 2nd class FS
- 3rd class FS
- 4th class FS
- 5th class FS
- Ø no or rare parasitic elements

Coefficient of variation

E > 20%
D = 15% - 20%;
C = 10% - 15%;
B = 5% - 10%;
A < 5% (advisable).

CATTLE AND BUFFALOES **FROZEN FAECES**

Flotac dual technique: FS combination and minimum PE detectable

1st combination suggested

FS 4	FS 9
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Dictyocaulus

2nd combination suggested

FS 4	FS 7
Eimeria GI strongyles Moniezia	Fasciola Paramphistomum Dicrocoelium Dictyocaulus

NOTE