LIVER FLUKE CONTROL
...geared for optimal liver health
The liver is the organ that is central in supporting: general health, vitality, production & reproduction. It has around 500 different functions essential to the health and production.

- **Supports almost every other organ**
- **Fights infections** (cleans the blood particles of infections, including bacteria etc.)
- **Filters out toxins** (neutralises and destroys toxins that are harmful to the animal)
- **Stores essential elements** eg.: vitamins and minerals (including trace minerals)
- **Responsible for the manufacture, regulation and break down of hormones**
*Fasciolosis* (liver fluke) is one of the most important parasitic diseases throughout the world including South Africa. It is a parasitic flatworm that can live within a wide range of hosts and is of major importance in livestock (cattle, sheep, and goats).
There are 2 species of liver fluke found in South Africa

**Common liver fluke** *(Fasciola hepatica)*
- Average 2.5 cm long and 1.5 cm wide
- Commonly found all over South Africa, where conditions are favourable

**Giant liver fluke** *(Fasciola gigantica)*
- Average 5.5 cm long and 1.5 cm wide
- More commonly found in the northern regions of South Africa
LIVER FLUKE: THE INTERMEDIATE HOST

The lifecycle is complex as it requires an intermediate host (freshwater snail) to complete its lifecycle.
LIVER FLUKE: TYPICAL HABITAT

- The typical habitat of liver fluke is wet, marshy areas or ponds. The water must be still or slow moving.
- Areas where pastures are irrigated can also be conducive to the survival of the parasite.
- In some cases water reservoirs and troughs can also be a source of the infection.
Liver fluke infections in cattle depend on a number of factors:

- The presence of **freshwater snails** (intermediate host) on the farm
- The presence of **suitable habitat** which includes wet, marshy areas or ponds. The water must be slow moving or still
- **Rainfall** which helps to wash the eggs out of faeces. Rainfall also maintains the water bodies where snails can survive
- **Temperature** also plays a big role in influencing infestations. Both liver fluke and snails thrive in warmer conditions
The liver fluke will grow by 187 times its size in a period of 8 weeks.
LIVER FLUKE: A RAPIDLY MULTIPLYING PARASITE

One animal can hold an infection of up to 300 mature flukes.

Each fluke can lay up to 50,000 eggs per day.

Eggs hatch to form first stage flukes.

These miracidia multiply inside the snail to create up to 4,000 cercariae each.

The cercariae leave the snail, encyst on vegetation, forming infective metacercariae.

1 animal

150 liver flukes

50,000 eggs per day

7,500,000 miracidia

4,000 cercariae

30,000,000,000 metacercariae (infective larvae)
Liver fluke cause severe damage to the liver, resulting in:

- Haemorrhage and blood loss
- Anaemia
- Liver scaring
- Reduced appetite
- Possible death
- Protein loss
- Loss of liver function
- Reduced immunity
- Reduced reproduction
- Reduced production
Once ingested, young fluke emerge from cysts in the small intestine, they penetrate the intestinal wall and enter the abdominal cavity. They migrate through the animal to the liver.

In cattle, ± 25% of the metacercaria ingested will reach the liver, the rest migrate through the body and cause damage to other organs.
The most significant damage to the liver is caused by the migrating immature stages.

The immature fluke stages will often outnumber the mature stages.

Damage caused by migrating liver fluke from ±2 weeks to adult stage.
LIVER FLUKE INFESTATION:
DAMAGE CAUSED BY ADULT FLUKE

THICKENING
CALCIFICATION
AND
BLOCKING OF
BILE DUCTS

Adult
LIVER FLUKE INFESTATION: EFFECT ON THE ANIMALS HEALTH

BOTTLE JAW CAUSED BY LIVER FLUKE INFESTATION
LIVER FLUKE INFESTATION: CLINICAL FORMS OF THE DISEASE

ACUTE

- Sudden severe illness/death, soon after infection (animals otherwise look healthy)
- Caused by massive intake of larvae
- Severe liver damage → massive blood loss
- More likely to occur in young animals
LIVER FLUKE INFESTATION: CLINICAL FORMS OF THE DISEASE

SUBACUTE

- Severe illness/occasional death
- Caused by moderate intake of larvae
- On going liver damage and blood loss
- Death most likely to occur when immature flukes are largest (~8 weeks post-infection)
- Some clinical signs prior to death
- More likely to occur in young animals
LIVER FLUKE INFESTATION:
CLINICAL FORMS OF THE DISEASE

CHRONIC

- Parasites acquired over time
- Clinical signs include lethargy, anaemia, emaciation, bottle jaw, distended abdomen
- On going low level liver damage and blood loss
- Death unlikely
- Occurs in animals of all ages
The economic impacts of liver fluke infection are related to:

- Reduced growth rates and weight gains
- Reduced milk production
- Reduced fertility
- Liver condemnation
- Mortality
- Secondary bacterial infections
LIVER FLUKE INFESTATION: IMPACT ON BODYWEIGHT OF SHEEP

In this trial: Liver fluke free sheep were dosed with *F. hepatica* metacercaria for 5 days each week for a period of 22 weeks, there was a tendency of poorer weight gain in the infected groups from week 20.

- Animals with the light infestation were dosed with 8 x *F. hepatica* metacercaria for 5 days each week for 22 weeks.
- Animals with the heavy infestation were dosed with 14 x *F. hepatica* metacercaria for 5 days each week for 22 weeks.

LIVER FLUKE INFESTATION HAS A 15 % IMPACT ON FOOD INTAKE THAT RESULTS IN POOR GROWTH IF NOT CONTROLLED.
The wool production of 20 Merino sheep, artificially infected with *Fasciola hepatica*, was compared with that of 20 uninfected controls. Sheep of two different ages, 6 months and 4 years, were fed in pens ad lib on two different diets giving high and low planes of nutrition. The mid side tattooed patch technique was used to measure the wool production over periods of 6 weeks prior to the infection date, and 0 - 6, 6 - 12, 12 - 18 and 18 - 24 weeks after this date. Infection with *F. hepatica* caused significant reduction of 20 - 39% in wool production from 6 weeks after infection, irrespective of age of the sheep or the plane of nutrition.

It was found that a reduction in wool production may occur without symptoms of fasciolosis being apparent.
LIVER FLUKE INFESTATION:
EFFECT ON THE LIVER

ADULT LIVER FLUKE
IN SHEEP LIVER
LIVER FLUKE INFESTATION: EFFECT ON MILK PRODUCTION IN CATTLE

In high risk fluke areas liver fluke is a significant threat to milk production. The effect of liver fluke on milk production is well documented:

- Milk loss due to liver fluke infections are up to 1 kg/day over a lactation.
- A heavy infection can cost around 300 litres in lost milk production per cow per year.
- A high incidence of liver fluke infestation can reduce milk butterfat concentration.
Liver fluke infestation in growing cattle has been shown to depress live weight gain by between 0.07 kg/week and 1.2 kg/week, depending on the size of the fluke burden.

- A heavy infection can cost up to 28.5% in reduced weight gain.

Liver fluke can affect weight gains in young growing cattle—having a direct effect on your income.

The graph charts the reduction in body weight expressed as weight loss on calves in differing severity of liver fluke infection.
LIVER FLUKE INFESTATION: EFFECT ON THE LIVER

The loss of income due to the condemnation could exceed R100 per animal slaughtered.

CONDEMNATION OF LIVERS AT ABATTOIR
LIVER FLUKE INFESTATION:
TREATING IMMATURE LIVER FLUKE PAYS

INCREASE IN BODY WEIGHT 20 WEEKS AFTER INFECTION

13 kg INCREASE

VERSUS TREATMENT OF OLDER LIVER FLUKES

Increase in body weight (kg)

Age of liver fluke at time of treatment

1 – 2 week stages

4 – 6 week stages

8 – 12 week stages

THE PARASITE
THE EFFECTS
THE IMPACT
DIAGNOSIS
CONTROL
THE PRODUCTS
There are a wide range of tests and methods available to detect liver fluke infections and prevalence.
Testing for liver fluke infection has traditionally been done by microscopic detection of fluke eggs in the faeces. **This test is not reliable in cattle and will only detect adult flukes.**

In cattle, liver flukes are irregular and intermittent egg layers.
DIAGNOSTIC METHODS: BLOOD AND MILK ELISA ANTIBODY TEST

The Elisa test is a test that detects the antibodies that cattle produce in response to liver fluke infections.

The test is highly accurate (98%) and antibodies can be detected 2-3 weeks after infection.
Liver fluke control can be challenging. The number of parasites in the host must be reduced as well as the fluke population present in the environment.

Effective, sustainable control must be based on an integrated parasite management program that includes:
- Chemical treatment
- Pasture/grazing management
- Fencing of contaminated areas (if practical)
- Repairing of leaking troughs
LIVER FLUKE CONTROL: THE ACTIVE INGREDIENTS

Fluke eggs in gall bladder
Ready for release into the digestive tract

Adult fluke in bile duct
Eggs layed ±10 to 12 weeks after infection

8 week old immature fluke
End of migratory phase, ready to enter bile duct

4 week old early immature fluke
Migratory phase, causing haemorrhage and scarring

2 week old fluke
Newly arrived from the gut

Level of control

Adult stage only
Clorsulon
Oxyclozanide
Nitroxynil

From 4 weeks to adult (dose dependant)
Closantel

All stages from 2 weeks to adult
Triclabendazole

KEY:
- Adult
- Immature
- Early Immature
- Migrating Stage
- Eggs inside the gall bladder
LIVER FLUKE CONTROL: A STRATEGY GEARED FOR OPTIMAL LIVER HEALTH

Use a strategic control strategy throughout the year to limit the production losses caused by liver fluke, based on 3 options:

- **Curative treatment**
- **Preventative treatment**
- **Optional treatment**
LIVER FLUKE CONTROL:
A STRATEGY GEARED FOR OPTIMAL LIVER HEALTH

**SHEEP**

**Use**
- FLUKAZOLE C

**COLD WINTER** – USE
- VIRBAMCE L

**WARM WINTER** – USE
- FLUKAZOLE C

**USE ANY ONE OF THESE**
- PRODOSE ORANGE
- PRODOSE YELLOW LA
- WIRECIDE F

**AUTUMN**

Optimal time for an autumn treatment is **April/May**
The autumn treatment is to control early immature, immature, and adult flukes to reduce liver damage

**LATE WINTER**

**EARLY SPRING**

Optimal time for the late winter/spring treatment is **August/September**
This is important to remove remaining flukes and stop pasture contamination with fluke eggs

**CATTLE**

**Use**
- FLUKAZOLE C

**COLD WINTER** – USE
- VIRBAMCE L

**WARM WINTER** – USE
- FLUKAZOLE C

**USE ANY ONE OF THESE**
- FLUKAZOLE C
- VIRBAMCE L
- PRO-INJECT YELLOW
- WIRECIDE F

**SUMMER**

An optional mid summer treatment may be required for heavily infested areas
Effective control of liver fluke relies on two key factors:

- Choice of product
- Timing of treatment

Maximum effect will be achieved by using the right product at the right time.
FLUKAZOLE C

COMBINATION OF ACTIVES WITH SYNERGISTIC ACTION

TRICLABENDAZOLE 12 % m/v
OXFENDAZOLE 4,53 % m/v

LIVER FLUKE
from early immature (2 weeks) to adult

TAPEWORM
MILK TAPEWORM (class 1)

ROUNDWORM
SHEEP
WIREWORM
BROWN STOMACHWORM
LARGE-MOUTHEDED BOWELWORM
LONG-NECKED BANKRUPTWORM
LUNGWORM
BANKRUPTWORM
HOOKWORM
WHITE BANKRUPTWORM

CATTLE
WIREWORM
BROWN STOMACHWORM
CATTLE BANKRUPTWORM
HOOKWORM
NODULAR WORM
LUNGWORM

Ovicidal (kills parasite eggs present in animal at treatment)

1 ml PER 10 kg

ORAL DRENCH
**FLUKAZOLE C**
**BENEFITS OF A SYNERGISTIC COMBINATION**

**LIVER FLUKE CONTROL – DUAL ACTIVE vs SINGLE ACTIVE ALONE**

Flukazole C contains two actives (Triclabendazole & Oxfendazole) that act synergistically to give superior liver fluke control.

- **DUAL ACTIVE SYNERGY**
  - 100%

- **SINGLE ACTIVE ONLY**
  - 89%

The sum of 2 parts combined is greater than the individual components.

**SYNERGY**

1 + 1 = 3

Boray, 1998

---

**THE LIVER**
**THE PARASITE**
**THE EFFECTS**
**THE IMPACT**
**DIAGNOSIS**
**CONTROL**
**THE PRODUCTS**
FLUKAZOLE C
benefits of a synergistic combination

Study of comparative efficacy of two oral formulations against 2 week old stages of liver fluke, showed obvious benefits of treating with FLUKAZOLE C.

CONTROL OF FLUKE AGED 2 WEEKS

<table>
<thead>
<tr>
<th>% reduction in total fluke count</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLUKAZOLE C</td>
</tr>
<tr>
<td>Non-synergised combination</td>
</tr>
</tbody>
</table>

NSW DPI study, 2006

FLUKE EGG COUNT DATA

<table>
<thead>
<tr>
<th>Average number of fluke eggs per gram of dung</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLUKAZOLE C</td>
</tr>
<tr>
<td>Non-synergised combination</td>
</tr>
</tbody>
</table>

NSW DPI study, 2006
Although antibody titres were still present 12 weeks after treatment (re-infestation after treatment), **FLUKAZOLE C reduced the antibody titre the most.** This is indicative of FLUKAZOLE C’s efficacy in eliminating fluke (all stages) present at treatment.

**Product 1**  
Oral product, non-synergistic, triclabendazole combination

**Product 2**  
Pour-on product, non-synergistic, triclabendazole combination

Data on file
FLUKAZOLE C
SOUTH AFRICAN TRIALS

A summary of the South African trials confirmed the results obtained in the Australian trials:

**TRIAL 1**
FLUKAZOLE C was the **only** product to **reduce both** the AST and GGT levels, 15 days after treatment

**Product 1**
Oral product, non-synergistic, triclabendazole combination

**Product 2**
Pour-on product, non-synergistic, triclabendazole combination

**Data on file**

<table>
<thead>
<tr>
<th>Control</th>
<th>Product 1</th>
<th>Product 2</th>
<th>FLUKAZOLE C</th>
</tr>
</thead>
<tbody>
<tr>
<td>% AST change</td>
<td>% AST change</td>
<td>% AST change</td>
<td>% AST change</td>
</tr>
<tr>
<td>-19%</td>
<td>-13%</td>
<td>-21%</td>
<td>-9%</td>
</tr>
<tr>
<td>% GGT change</td>
<td>% GGT change</td>
<td>% GGT change</td>
<td>% GGT change</td>
</tr>
<tr>
<td>19%</td>
<td>10%</td>
<td>23%</td>
<td></td>
</tr>
</tbody>
</table>
**TRIAL 2**

In a **heavily infested** herd, **FLUKAZOLE C** was the only product to **reduce both** the AST and GGT levels from 10 to 15 days.

**Product 1**

Oral product, non-synergistic, triclabendazole combination

**Product 2**

Pour-on product, non-synergistic, triclabendazole combination

**Data on file**

<table>
<thead>
<tr>
<th>Control</th>
<th>Product 1</th>
<th>Product 2</th>
<th>FLUKAZOLE C</th>
</tr>
</thead>
<tbody>
<tr>
<td>% AST change</td>
<td>% AST change</td>
<td>% GGT change</td>
<td>% GGT change</td>
</tr>
<tr>
<td>3%</td>
<td>37%</td>
<td>32%</td>
<td>21%</td>
</tr>
<tr>
<td>0%</td>
<td>3%</td>
<td>-8%</td>
<td>-6%</td>
</tr>
</tbody>
</table>
VIRBAMEC® L

COMPREHENSIVE INTERNAL & EXTERNAL PARASITE CONTROL

LIVER FLUKE
- LIVER FLUKE (adults)
- GIANT LIVER FLUKE (adults)

PARAFILARIA
- IN CATTLE (aids in the control)

EXTERNAL PARASITES
- BROAD SPECTRUM

ROUNDWORM
- SHEEP
  - WIREWORM
  - BROWN STOMACHWORM
  - BANKRUPTWORM
  - HOOKWORM
  - NODULAR WORM
  - LARGE-MOUTED BOWELWORM
  - LUNGWORM
  - LONG-NECKED BANKRUPTWORM

- CATTLE
  - WIREWORM
  - BROWN STOMACHWORM
  - BANKRUPTWORM
  - HOOKWORM
  - NODULAR WORM
  - LUNGWORM
  - EYEWORM

IVERMECTIN 1 % m/v
CLORSULON 10 % m/v
PRO-INJECT® YELLOW

LOW DOSE INJECTABLE SOLUTION

CLOSANTEL 10 % m/v

LIVER FLUKE
- LIVER FLUKE (adults)
- GIANT LIVER FLUKE (adults)

ROUNDWORM
- WIREWORM
- HOOKWORM
- NODULAR WORM

PERSISTENCY
- 3 WEEKS

1 ml PER 40 kg
### Wirecide F

**Alternative active in parasite control**

<table>
<thead>
<tr>
<th><strong>LIVER FLUKE</strong></th>
<th><strong>ROUNDWORM</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>LIVER FLUKE (adults)</td>
<td>SHEEP</td>
</tr>
<tr>
<td>GIANT LIVER FLUKE (adults)</td>
<td>WIREWORM</td>
</tr>
</tbody>
</table>
| **PARAFILARIA** | | NOOITGEDACHT-RESISTANT WIREWORM STRAIN $f$
| **IN CATTLE** | | KOKSTAD-RESISTANT WIREWORM STRAIN $f$
| DOUBLE DOSE: 3 ml per 50 kg | | WHITERIVER-RESISTANT WIREWORM STRAIN $f$
| **NASAL BOT** | | NODULAR WORM |
| **IN SHEEP** | | |

- NITROXYNIL 34 % m/v

1.5 ml per 50 kg

---

$f$ Resistant strains
PRODOSE® YELLOW LA

INTERNAL PARASITE CONTROL WITH RESIDUAL EFFICACY

CLOSANTEL 7,5 % m/v

ORAL DRENCH

1 ml PER 10 kg

LIVER FLUKE
LIVER FLUKE from 6 weeks to adult
GIANT LIVER FLUKE from 6 weeks to adult
CONICAL FLUKE DOSE: 1,3 ml per 10 kg

ROUNDWORM PERSISTENCY
WIREWORM 5 WEEKS
HOOKWORM 2 WEEKS

NASAL BOT
Highly effective against 1st, 2nd and 3rd instar larvae
PRODOSE® ORANGE

INTERNAL PARASITE CONTROL WITH RESIDUAL EFFICACY

**ORAL DRENCH**

**LIVER FLUKE**

- **LIVER FLUKE** from 6 weeks to adult
- **GIANT LIVER FLUKE** from 8 weeks to adult

**TAPEWORM**

- **Milk Tapeworm** (class 1)

**NASALBOT**

Controls all stages

**ROUNDWORM**

**PERSISTENCY**

- **Wireworm**
- **Brown Stomachworm**
- **Bankruptworm**
- **Long-Necked Bankruptworm**
- **Hookworm**
- **Nodular Worm**
- **Large-Mouthed Bowelworm**
  - **Ovicidal** (kills parasite eggs present in animal at treatment)

**ALBENDAZOLE** **1.90 % m/v**

**Closantel** (as sodium) **3.94 % m/v**

**2 ml PER 10 kg**
REFERENCES


5. The University of Reading, Department of Agricultural and Food Economics, The Economics of Fascioliasis (Liver fluke).

