

To determine
F10 Antiseptic Wound Spray with Insecticide residue MRL
compliance for beef and milk on open wounds

Date

2026-07-15

**F10 Antiseptic Wound Spray
with Insecticide residues**



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F10 Antiseptic Wound Spray with Insecticide residues



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Abstract

F10 Antiseptic Wound Spray with Insecticide is a non-systemic open wound topical spot treatment combination of Cypermethrin insecticide (pyrethroid family) and quaternary ammonium compounds as the antiseptic component. The OTC product is applied as a spray from 10cm to 15cm from the wound site to completely cover a wound of approximately 41cm² with one trigger action having dose of 0.87g. The sister product F10 Antiseptic Barrier Ointment with Insecticide has the same cypermethrin content. Both are used daily in other parts of the world but are unique to the open wound management task against NWS infestations in the USA. They both have been given EUA and remain the only combination available on the US market. For this reason and taking account that both products have zero withholding periods, have had no adverse reports after 17 years against old World Screwworm in South Africa where this blow fly is endemic this study is a bridging study to substantiate safety margins to allow reduced Withholding Periods to be applied to livestock meat and milk treatments.

This study estimates the quantity of product and Cypermethrin that may be absorbed through exposed wound tissue over time periods of 1, 3 and 30 minutes to align with the insecticide action observed in the product larvae study which showed that immediate migration of larvae from treated surfaces was observed within approximately 30 seconds of application, approximately 77% knockdown of *Lucilia cuprina* larvae was reported within 15 minutes and the majority was dead within 30 minutes.

An ex vivo meat model was used to simulate an open wound surface. Homogeneous tenderised beef samples of approximately 42 cm² were sprayed once with F10 Antiseptic Wound Spray with Insecticide and allowed to absorb for time periods of 1, 3 and 30 minutes. Product absorption was determined gravimetrically from changes in sample mass following correction for evaporative losses using untreated control samples.

The average quantity of Cypermethrin absorbed by the meat samples was calculated to be 0.00084 g, 0.00087 g, and 0.00068 g after 1, 3, and 30 minutes respectively.

When extrapolated to the bodyweight of typical Holstein cattle and milk production volumes of dairy cows, the calculated exposure levels were extremely low, all well below US MRL levels for beef meat (200 dose safety margin), and milk 5 to 6 dose safety margin).

Note was taken of the EPA authorisations given to pyrethroid insecticidal topical sprays and aerosols on food producing animals to combat NWS have been given zero withholding periods for beef, and zero for milk.

1 Experimental Procedure

Tenderised beef meat samples were used as the equivalent of an open wound on a mammal because of the irregular surface resulting from the tenderizing process. Visual checks were made to ensure that samples were homogeneous and would not allow the liquid to flow through the sample without being absorbed in the meat tissue.

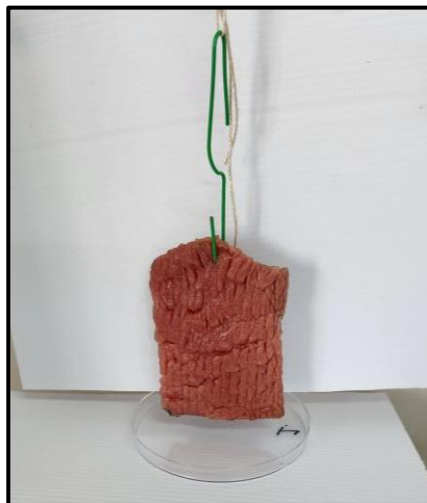
The meat was cut into sample squares of approximately 42cm² as stated on the label for a measured single spray.

The meat samples were weighed before hanging them on a hook as per Figure 1 below.

The meat samples were sprayed with a single measured spray dose of F10 Antiseptic Wound Spray with Insecticide from approximately 15 cm. Immediately after the spray, a timer was started for one, three and thirty minutes (different sets of experiments), allowing the product to be absorbed into the meat and the excess product to run-off. After the lapsed time, the meat sample was again weighed. Five repeats for each time interval were conducted, i.e. a total of fifteen weighing.

A blank sample was also conducted for each time interval, i.e. meat was hung for the respective time interval without spraying it with any product. The mass prior and after the respective time intervals was used to determine the mass difference due to evaporation and drying of the meat, accounting for any meat moisture loss. These blank measurements were considered during the final calculations.

Figure 1: Experimental set-up at start of experiments.



42m² tenderized beef sample

2 Results

F10 Wound Spray with Insecticide product absorbed on 42 cm² sample after one measured spray application dose after 1, 3, and 30 minutes as shown in Table 1

Table 1. Product absorbed on meat samples

Total product applied (g)	Product absorbed (g) (Calculated from mass difference before and after spraying of sample)			Product run off, spray excess outside the sample area and evaporation		
	After 1 minute	After 3 minutes	After 30 minutes	After 1 minute	After 3 minutes	After 30 minutes
0.930g	0.353g (37.957%)	0.389g (41.828%)	0.187g (20.108%)	0.577 (62.043%)	0.541 (58.172%)	0.743 (79.892%)
0.930g	0.386 (41.505%)	0.241 (25.914%)	0.119 (12.796%)	0.544 (58.495%)	0.689 (74.086%)	0.811 (87.204%)
0.930g	0.341 (36.667%)	0.339 (36.452%)	0.252 (27.097%)	0.589 (63.333%)	0.591 (63.548%)	0.678 (72.903%)
0.930g	0.289 (31.075%)	0.401 (43.118%)	0.192 (20.645%)	0.641 (68.925%)	0.529 (56.882%)	0.738 (79.355%)
0.930g	0.315 (33.871%)	0.368 (39.570%)	0.166 (17.849%)	0.615 (66.129%)	0.562 (60.430%)	0.764 (82.151%)
Average	0.337 (36.215%)	0.348 (37.376%)	0.183 (19.699%)	0.593 (63.785%)	0.582 (62.624%)	0.747 (80.301%)

2.1 Cypermethrin absorbed on samples during study

Absorption and hence residue was determined by weighing the beef sample before and after each spray application of the total product at 1,3, and 30 minutes with each time repeated five times, a total of 15 weighing. The Cypermethrin content is predetermined by the product's formulation, i.e. 0.25g/100g. Table 2 shows the Cypermethrin content of each sample calculated from the absorbed spray weight.

The 15 sample measurements of each time were subjected to descriptive statistical evaluation. These measurements yielded a mean value of 0.0008555 ± 0.0001241 (standard deviation).

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The differences in the mass of Cypermethrin absorbed after 1 minute and 3 minutes can be regarded as negligibly small and within the statistical variance range for the data indicating that total runoff takes place immediately.

After 30 minutes, there is a further 21.8% reduction in the cypermethrin absorbed (reduction from 0.00087 to 0.00068). This reduction can be attributed to the evaporation of the volatile components such as alcohol in the product applied, leaving behind the Cypermethrin chemical residue on the surface of the wound site to act against NWS reinfestation.

Table 2. Cypermethrin absorbed on meat samples

Cypermethrin component of product sample (g) (Based on 0.25g/100g Cypermethrin in product)	Cypermethrin absorbed (g)		
	After 1 minute	After 3 minutes	After 30 minutes
0.002325	0.00088 (37.957%)	0.00097 (41.828%)	0.00069 (29.570%)
0.002325	0.00097 (41.505%)	0.00060 (25.914%)	0.00052 (22.258%)
0.002325	0.00085 (36.667%)	0.00085 (36.452%)	0.00085 (36.559%)
0.002325	0.00072 (31.075%)	0.00100 (43.118%)	0.00070 (30.108%)
0.002325	0.00079 (33.871%)	0.00092 (39.570%)	0.00064 (27.312%)
Average**	0.00084 (36.215%)	0.00087 (37.376%)	0.00068 (29.161%)

The Holstein cattle breed was selected by age and weight. (NB residual values do not vary with age or size of an animal because the common denominator is the wound site).

Table 3. Average Cypermethrin absorbed, mg/Kg bw, in relation to cattle size.

Time (minutes)	Cypermethrin absorbed (g)	Cypermethrin (mg) / bodyweight (kg) (ppm) Holstein cattle		
		2-3 years 600kg	3-4 years 680kg	4-8 years 750kg
1	0.00084	0.0014	0.0012	0.0011
3	0.00087	0.0014	0.0013	0.0012
30	0.00068	0.0011	0.0010	0.0009
US MRL (meat)*		0.2000	0.2000	0.2000

- EPA (Refer 40CFR 180.418. July 7, 2026)

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Table 4: Cypermethrin residue per bodyweight for Black Angus cattle. (NB residual values do not vary with age or size of an animal because the common denominator is the wound site).

Time (minutes)	Cypermethrin absorbed (g)	Cypermethrin (mg) / bodyweight (kg) (ppm) Black Angus cattle		
		2-3 years 580kg	3-4 years 650kg	4-8 years 680kg
1	0.00084	0.0015	0.0013	0.0012
3	0.00087	0.0015	0.0013	0.0013
30	0.00068	0.0012	0.0010	0.0010
US MRL (meat)*		0.2000	0.2000	0.2000

- EPA (Refer 40CFR 180.418. July 7, 2026)

There is little variation in the residue values between the Holstein and Black Angus cattle due to the similarity in weights over the period 2 yrs to 8 yrs, with values ranging from 0.0011mg/kg to 0.0010mg/kg both well within the MRL compliance limits for meat of 0.2000mg/kg with a safety margin of 200 doses.

Table 5: Cypermethrin residues per daily milk production for different ages of Holstein cows

Time (minutes)	Cypermethrin absorbed (g)	Cypermethrin (mg) / daily milk production (L) (ppm) Holstein cattle		
		2-3 years 32L / day / animal	3-4 years 36L / day / animal	4-8 years 45L / day / animal
1	0.00084	0.0263	0.0234	0.0187
3	0.00087	0.0272	0.0241	0.0193
30	0.00068	0.0212	0.0188	0.0151
US MRL (milk) *		0.1000	0.1000	0.1000

- EPA (Refer 40CFR 180.418. July 7, 2026)

The Cypermethrin dispersion rate will continue over time however the table shows even after 3 minutes this increases by 20% at 30 minutes and shows at that time a safety margin of an average of 6 doses less than the US MRL for milk.

2.2 Cypermethrin breakdown

Cypermethrin belongs to the synthetic pyrethroid class of insecticides and has been extensively evaluated in food-producing animals by the Environmental Protection Agency (EPA). EPA reports indicate that cypermethrin is metabolised through cleavage of the ester bond to form more water-soluble metabolites which are subsequently excreted in urine and faeces. Cypermethrin is rapidly absorbed following oral administration and rapidly eliminated through normal metabolic pathways. Although dermal absorption is considerably slower, systemic metabolism remains efficient once absorption occurs.

Published residue depletion investigations have demonstrated a rapid decline in Cypermethrin residues following treatment. Information provided from historical residue depletion studies indicated that greater than 97% of absorbed Cypermethrin was eliminated within approximately 3 – 4 days after treatment. Recovery of parent Cypermethrin in milk was also reported to be extremely low, with less than 1% of administered material detected following treatment.

The results of the present study should be interpreted together with these metabolism data. The maximum average quantity of Cypermethrin absorbed into tissue was approximately 0.00087 g per treatment. This amount represents only a small fraction of the Cypermethrin contained in the applied spray dose and an even smaller fraction when considered relative to the body mass of cattle.

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Consequently, the combination of:

- Low tissue absorption,
- Localised topical application,
- Minimal systemic exposure, and
- Rapid metabolic elimination,

suggests that the potential for significant tissue or milk residues following correct use of F10 Antiseptic Wound Spray with Insecticide is very low.

Regulatory authorities have established maximum residue limits (MRLs) for Cypermethrin in bovine muscle, fat, liver, kidney and milk, reflecting confidence in the residue depletion profile of the molecule when used appropriately.

3 Discussion

A key residual safety advantage of F10 Antiseptic Wound Spray with Insecticide is that the application is wound specific which localises insecticidal activity to the wound site where fly control is required, thereby minimising unnecessary systemic exposure. The findings of this study demonstrate that only very small quantities of Cypermethrin are absorbed following application, with mean absorbed amounts consistently below 1 mg per treatment across all sampling intervals. These results indicate that the majority of the active ingredient remains on the surface of the wound where its intended insecticidal effect is exerted, rather than being systemically distributed throughout the animal.

Assuming a constant quantity of Cypermethrin is absorbed following topical application, the resulting residue concentration decreases proportionally as the body mass of the animal or the volume of milk produced increases due to a dilution effect. Consequently, larger cattle will exhibit lower theoretical tissue residue concentrations (mg/kg or ppm) than smaller animals receiving the same treatment, while higher-producing dairy cows will exhibit lower theoretical milk residue concentrations (mg/L or ppm) than lower-producing animals. Under the highly conservative worst-case assumption that 100% of the absorbed Cypermethrin is distributed uniformly throughout the edible tissues of the animal or excreted entirely into the daily milk yield, the calculated residue concentrations remain substantially below the established maximum residue limits (MRLs) for Cypermethrin of 0.2 ppm in meat and 0.1 ppm in milk. Furthermore, as animal bodyweight and milk production increase, the margin of safety relative to the applicable MRLs increases correspondingly, demonstrating that the negligible quantities of Cypermethrin absorbed following topical administration are unlikely to result in residue concentrations of regulatory concern, even under assumptions that significantly overestimate real-world residue transfer and consumer exposure.

4 References

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