



Calculations to Determine the Amount of Terramycin® 200 for Fish (Oxytetracycline Dihydrate)
Type A Medicated Article to Add to Fish Feed

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Terramycin® 200 for Fish (Oxytetracycline Dihydrate) Type A Medicated Article (TM200; Phibro Animal Health, Ridgefield Park, NJ) contains 200 g active oxytetracycline (OTC) per lb and is approved for use in U.S. aquaculture for the following indications: (1) control of ulcer disease (causative agent, *Hemophilus piscium*), furunculosis (causative agent, *Aeromonas salmonicida*), bacterial hemorrhagic septicemia (causative agent, *A. liquefaciens*), and pseudomonas disease (causative agent, *Pseudomonas* spp.) in salmonids; (2) control of mortality in freshwater-reared salmonids due to coldwater disease (causative agent, *Flavobacterium psychrophilum*); (3) control of mortality in all freshwater-reared *Oncorhynchus mykiss* due to columnaris disease (causative agent, *F. columnare*); (4) control of hemorrhagic septicemia and pseudomonas disease in catfish; (5) marking of skeletal tissue in Pacific salmon; and (6) control of gaffkemia (causative agent, *Aerococcus viridans*) in lobster.

For indications (1) and (4), TM200 is administered orally in feed at 2.5 – 3.75 g OTC per 100 lb fish per day (55.1 - 82.7 mg OTC per kg fish per day) for 10 consecutive days. For indications (2) and (3), TM200 is administered orally in feed at 3.75 g OTC per 100 lb fish per day for 10 consecutive days. For indication (5), TM200 is administered orally in feed at 11.35 g OTC per 100 lb fish/day (250 mg per kg fish per day) for 4 consecutive days. For indication (6), TM200 is administered at 1 g OTC per lb feed per d for 5 consecutive days. Also, work is underway to expand the product label to include administering TM200 orally in feed for the skeletal marking of *all* freshwater-reared salmonids.

Currently, TM200 can be incorporated into fish feed by a commercial feed manufacturer or purchased “over-the-counter” and top-coated onto fish feed. The product label lists the pounds of TM200 to add per ton of feed to achieve dose rates of 2.5 and 3.75 g OTC per 100 lb fish per day when fish are fed at 1, 2, 3, ..., 10 and 15% mean body weight (BW). However, in many cases, fish culturists might top-coat TM200 onto a relatively small amount of feed (e.g., ≤ 50-lb or 20-kg bags) and feed fish at a percent BW not listed on the

product label. As such, in this bulletin, the mathematical relations between (a) percent BW to feed and (b) percent TM200 to add per unit of feed to achieve doses of 2.5 and 3.75 g OTC per 100 lb fish per day are described. Also, it is shown how to calculate the grams of TM200 to add to any amount of feed to achieve doses of 2.5 – 3.75 g per 100 lb fish per day when fish are fed at any body weight between 1 and 15%.

Methods

For each of 2.5 and 3.75 g OTC per 100 lb fish per day, pounds of TM200 per ton of feed were first converted to percent TM200 per unit of feed at feeding rates of 1, 2, 3, ..., 10 and 15% BW, and then grams of TM200 to add to 50-lb and 20-kg bags of feed were calculated (Tables 1 and 2). The percent TM200 per unit of feed was plotted against percent BW to feed, and a first-order, inverse polynomial equation was fit to the plotted points. Fits were verified by predicting grams of TM200 to add to 50-lb and 20-kg bags of feed at 1, 2, 3, ..., 10 and 15% BW (data not shown). Finally, examples are provided to show (a) how to calculate the grams of TM200 to add to 20 kg of feed when feeding at 5% BW and treating at 2.5 or 3.75 g OTC per 100 lb fish per day and (b) how to adjust the result of the 3.75-g dose calculation to treat at any dose between 2.75 and 3.75 g OTC per 100 lb fish per day.

Results

For 2.5 g OTC per 100 lb fish per day, the relation ($r^2 = 1$) between percent BW and percent TM200 (Figure 1) is described by the equation:

$$\% \text{ TM200} = (1.250 \div \% \text{ BW}) + 0.00008115$$

For 3.75 g OTC per 100 lb fish per day, the relation ($r^2 = 1$) between percent BW and percent TM200 (Figure 1) is described by the equation:

$$\% \text{ TM200} = (1.875 \div \% \text{ BW}) + 0.00008781$$

For either 2.5 or 3.75 g OTC per 100 lb fish per day,

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determining the grams of TM200 to add to any amount of feed when feeding at 1 - 15% BW is a simple, three-step process (as follows): (1) enter percent BW into the equation to calculate percent TM200 to add to feed; (2) convert percent TM200 to a decimal fraction; and (3) multiply the result by the grams of medicated feed to prepare.

Example 1: Dose = 2.5 g OTC per 100 lb fish per day

If fish are fed at 5% BW and one 20-kg bag of medicated feed needs to be prepared, the percent TM200 to add to feed = $(1.250 \div 5) + 0.00008115 = 0.2500008\%$, which equates to a decimal fraction of 0.0025. Finally, $(0.0025 \times 20,000 \text{ g}) = 50.0 \text{ g}$ TM200 to add to one 20-kg bag of feed.

Example 2: Dose = 3.75 g OTC per 100 lb fish per day

If fish will be fed at 5% BW and one 20-kg bag of medicated feed needs to be prepared, the percent TM200 to add to feed = $(1.875 \div 5) + 0.00008781 = 0.37500009\%$, which equates to a decimal fraction of 0.00375. Finally, $(0.00375 \times 20,000 \text{ g}) = 75.0 \text{ g}$ TM200 to add to one 20-kg bag of feed.

Note: In Example 2, if the dose was reduced to 3.00 g OTC per 100 lb fish per day and the feeding rate was held at 5% BW, the grams of TM200 to add to one 20-kg bag of feed would be proportionally reduced from 75 to 60 g (as follows): $75 \text{ g} \times (3.00 \div 3.75) = 60 \text{ g}$. Such proportional reduction will work for any dose between 2.75 and 3.75 g OTC per 100 lb fish per day.

Table 1. Target dose = 2.5 g OTC per 100 lb fish per day: To determine amount of TM200 to add to either a 50-lb (22,680 g) or 20-kg (20,000 g) bag of feed, find the percent body weight (% BW) at which to feed, go to the fourth or fifth row of the table, and read the amount (g) of TM200 to add.^a

%BW	1	2	3	4	5	6	7	8	9	10	15
%TM200	1.2500	0.6250	0.4165	0.3125	0.2500	0.2085	0.1785	0.1565	0.1390	0.1250	0.0835
Amount (g) of TM200 to add to either a 50-lb or 20-kg bag of feed											
50 lb	283.5	141.7	94.5	70.9	56.7	47.3	40.5	35.5	31.5	28.3	18.9
20 kg	250.0	125.0	83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	16.7

^aAmount (g) of TM200 to add to a specific amount (g) of feed = [(amount (g) of feed to be treated) × (percent TM200 to add ÷ 100)].

Table 2. Target dose = 3.75 g OTC per 100 lb fish per day: To determine amount of TM200 to add to either a 50-lb (22,680 g) or 20-kg (20,000 g) bag of feed, find the percent body weight (% BW) at which to feed, go to the fourth or fifth row of the table, and read the amount (g) of TM200 to add.^a

%BW	1	2	3	4	5	6	7	8	9	10	15
%TM200	1.875	0.9375	0.6250	0.4690	0.3750	0.3125	0.2680	0.2345	0.2085	0.1875	0.1250
Amount (g) of TM200 to add to either a 50-lb or 20-kg bag of feed											
50 lb	425.2	212.6	141.7	106.4	85.0	70.9	60.8	53.2	47.3	42.5	28.3
20 kg	375.0	187.5	125.0	93.8	75.0	62.5	53.6	46.9	41.7	37.5	25.0

^aAmount (g) of TM200 to add to a specific amount (g) of feed = [(amount (g) of feed to be treated) × (percent TM200 to add ÷ 100)].

Figure 1. Relation between percent TM200 to add to feed and percent BW to feed to achieve doses of 2.5 and 3.75 g oxytetracycline/100 lbs fish/day.

