

I estimate the market values of these feeds, in normal times, to be as follows: the cattle feed, \$40 per ton; hog feed, \$50 per ton; poultry feed, \$45 per ton and the dog biscuit, \$100 per ton.

For comparison it may be of interest to quote recent prices (April, 1917) given me by some leading manufacturers and dealers of other protein concentrates now used by farmers in this country:

	<i>Protein</i>	<i>Price</i>
Linseed cake meal . . . . .	40 per cent . . . . .	\$54 f.o.b., Toronto
Cotton cake meal . . . . .	20 to 24 per cent . . . . .	\$40 " "
Tankage . . . . .	60 per cent . . . . .	\$65 " "

Besides the experimental feeding being conducted by the Central Experimental Farm, I, myself, tried a ton on my own farm. Being absent from home on this investigation, I could not conduct the experiment on the usual lines, but, in any case, my chief object was to ascertain if this fresh-water fish waste was as attractive to live-stock as salt-water waste of which I have had previous experience. As a result, I have no hesitation in saying that all stock fed on this material properly compounded did well and relished it. I fed it to 20 head of cattle, 20 head of pigs and about 100 poultry. Further, I fattened off one 'beast' on fish meal and bran and sold him at 8½ cents per pound on the hoof.

I am, therefore, satisfied that fresh-water fish waste properly made up is a suitable and economic protein and fat concentrate for all farm live-stock.

#### OIL

So much for the utilization of the dry residue of fish waste. The other economic product obtained is oil. This I found varied both in quantity and quality in relation to the type of waste brought into port.

Some days the waste would consist chiefly of lake herring viscera, while on others, of whole fish, chiefly eel pouts (*Iota maculosa*) and small blue pickerel (*stizostedion canadense*) that had been 'bridled'; sometimes the waste was a mixture of all. So, in order to get some idea of the relative values and types of oil, I divided the waste into two classes, namely, fish guts and mixed waste.

In the boiling process, I found that I obtained oil of a lighter quality as to colour, freedom from strong smell and purity if the material was kept at 212° F. for one hour, keeping it well disintegrated by constant agitation during the whole period. By continuing the boiling, I found the oil became charred and got darker until it boiled itself at 361° F. I conducted some refining and bleaching tests but got only a few really satisfactory results owing to the constant varying of the oil origin, how-