

APPENDICES.

APPENDIX 1.—ANALYSES OF FISH-WASTE MANURE.

THE following analyses are given to indicate how valuable is fish-waste as an aid to agriculture. For example, a fish guano, composed largely of dogfish, skate, and other species of little value as food, prepared at a reduction-works at British Columbia, showed the following results:—

Water	..	..	..	..	..	12.65
Oil	..	..	..	..	..	1.55
Organic matter rich in nitrogen	..	..	..	..	..	77.45
Phosphoric acid	..	..	..	..	..	3.40
Lime	..	..	..	..	..	1.76
Alkalies	..	..	..	..	..	3.09
Earthy matter	..	..	..	..	..	0.10
						100.00

The analysis is that of Dr. Hughes, District Agricultural Chemist for Herefordshire, and Consulting Chemist to the Ceylon Coffee-planters' Association. This authority says that the sample proved to be very free from oil, and contained twice as much nitrogen as ordinary guano, and was worth in the markets probably £7 or £8 per ton.

Another analysis of salmon-waste from salmon-canning establishments in British Columbia showed the following results:—

Water	..	..	..	..	..	5.19
Organic matter	..	..	..	..	..	46.99
Mineral matter	..	..	..	..	..	47.82
						100.00

(NOTE.—In the organic matter the nitrogen amounted to 3.47; and in the potash phosphoric acid amounted to 17.60.)

Professor Shutt, of Ottawa Central Experimental Farm, Canada, stated that it was a very valuable manure, especially for wheat and other grain crops, or for application to soils poor in nitrogen and phosphoric acid. He estimated its value at about £7 per ton, the nitrogen-contents being valued at about £2 3s. 6d. in the ton, and phosphoric acid being nearly £4 15s. 6d. in the ton.

Such analyses indicate how desirable it is that fish-waste should be converted into materials of which the agriculturist is so greatly in need.

APPENDIX 2.—PROCESS OF CANNING FISH.

The details of cooking methods, &c., vary with different species of fish, but the following particulars as to the methods of handling salmon in British Columbia indicate some features of the process:—

1. The fish are first lifted from the wharf on to the cleaning-tables, where, either by an automatic machine or the knife of a gutter, the head, tail, and back and under-fins are cut off, the fish ripped open, and the entrails removed.

2. The gutted fish is then washed in a tank of running water and the blood and clinging inside membranes removed. A second washing and cleaning process is usually adopted, and the fish is passed into a rotating knife wheel which severs an average-sized fish into four slices.*

3. Empty cans are then filled by hand or by a plunger machine.

4. The sealed cans are subjected to the first boiling at 212° F.

5. The cooked cans are removed from the retort or kettle and pierced to allow the air to escape. They are then resealed.

6. The cans are subjected to a second cooking in a retort or large kettle, the water in which rises to a temperature of 240° F.

By this process it will be seen that Pacific salmon are really overcooked: and it is this that increases the tenderness and table qualities of the fish, the principal species of which are in a fresh condition rather hard and dry. No doubt many New Zealand fish could be subjected to a similar process and thereby improved. Delicate oily fish and fish of the nature of whitebait, however, must be subjected to a less intense temperature.

* The principal commercial salmon in British Columbia (the sockeye) is from 4 lb. to 6 lb.