

*The Bushel.*—In New Zealand certain agricultural seeds are in general sold neither by bushel capacity nor by the pound weight. They are sold upon an entirely arbitrary weight which is called a "standard bushel." The bushel standards are practically universally acknowledged throughout the trade in New Zealand. They are as follows: Oats, 40 lb.; wheat, 60 lb.; rye-grass, 20 lb. The number of bushels in a sack or in a line of many sacks is estimated on the number of pounds avoirdupois. Thus a sack containing 140 lb. of rye-grass contains  $140 \div 20 = 7$  bushels, and is bought, quoted, and sold as 7 bushels. Again, a 48 in. sack may contain 160 lb. of rye-grass, in which case it is reckoned as containing  $160 \div 20 = 8$  bushels. This kind of bushel has no connection with the bushel of capacity, which equals 1.28 cub. ft., nor has it much real connection with the term "bushel weight," which is the actual weight of a definite capacity of 1 bushel = 1.28 cub. ft., as discussed later. The most that can be said of it is that it has to do with the bushel weight, inasmuch as it is the *accepted* bushel weight for oats, wheat, and rye-grass. The most accurate conception of the basis on which rye-grass is bought and sold in New Zealand is that the transactions are made at a price per 20 lb. lot; similarly, with wheat, at a price per 60 lb. lot; and oats, at a price per 40 lb. lot. The standard of 40 lb. per bushel for oats, while constant in the New Zealand trade, may or may not agree with the standard of other places. For instance, the legal standard bushel in the United States for oats is 32 lb., while in Great Britain it is 40 lb. and 42 lb. for local, and 38 lb. and 40 lb. for foreign oats. Our standard of 60 lb. for wheat agrees exactly with that of the United States, but differs from the British, which is 63 lb. for local and 62 lb. for foreign wheat.

*Bushel Weight.*—The discussion of the term "bushel" naturally leads into a consideration of the term "bushel weight," which expresses the approximate (usually correct to the nearest pound avoirdupois) weight of a volume of seed measuring 1 bushel or 1.28 cub. ft. The intrinsic value of the amount covered by the expression "bushel weight" depends upon two factors—namely, the true density and the apparent density of the seeds.

True density: In physics this is the ratio of mass to bulk (or volume) of matter. In seed work the bushel weight is raised or lowered according to the density of the various parts of each seed. The density of the compact moist mass of starch, &c., constituting the kernel of rye-grass, for instance, is greater than that of the dry aggregation of empty cells constituting the chaff. If, then, the individual seeds of a line have very large kernels, as in certain Canterbury rye-grasses, or large kernels as compared with the weight of the chaff after dressing, as is strikingly exhibited in certain Hawke's Bay lines, then the total density of each seed is very great, and the weight of a bushel is high—perhaps 35 lb. If, on the other hand, another line, possibly through an unfavourable season, immaturity at harvest-time, or bad or long storage, consists of kernels that are shrivelled or small in relation to their chaff (or glumes), then a greater proportion of the seed consists of chaff than in the first instance, and the total density of each seed is less and the bushel weight low—perhaps as low as 25 lb. per bushel. From this it will be seen that the variation in bushel weight arising from true density in a seed like rye-grass that has such a large chaffy covering must be much greater than the variation from the same cause in the bushel weight of wheat, which is practically all kernel.