time of the year, the manufacture of casein has been found in some countries, *e.g.* the United States, New Zealand, Argentine, and France, to be of greater profit than was at first expected; separated milk is used, the fat being employed for butter-making. The uses of casein are manifold, and it now finds application in a number of trades.

Another milk by-product which often proves a great embarrassment to the cheese-maker is whey, the milk sugar of which is valuable. The commercial manufacture of milk sugar is given, together with details of the necessary plant.

The information and the technical details given in this volume are likely to be very valuable to those engaged in the milk industry, especially to the manager of a factory where the condensing or drying of milk is practised.

Handbuch der allgemeinen Chemie. Herausgegeben von Prof. Paul Walden und Prof. Carl Drucker. Band 5: *Mechanische Eigenschaften flüssiger Stoffe; Volumen, Dichte, Kompressibilität, Oberflächenspannung, Innere Reibung.* Von Prof. R. Kremann. Pp. xii + 598. (Leipzig: Akademische Verlagsgesellschaft m.b.H., 1928.) 46·50 gold marks.

A NOTEWORTHY development in physical chemistry during the last twenty years is the increasing amount of attention paid to those properties of liquids which are primarily due to the cohesive forces between molecules. Compressibility, surface properties, and viscosity have attracted the interest of many investigators, both in Europe and in America, and the new knowledge gained of the behaviour of liquids has found many important applications in industry. Prof. Kremann's book on the mechanical properties of liquids is therefore a welcome contribution to physico-chemical literature and provides a valuable work of reference for students and investigators in this field.

The book is divided into three parts dealing with volume relations, viscosity, and surface tension (including interfacial tension). Each section opens with a useful survey of the experimental methods available for measuring the property studied, followed by a discussion of the influence of temperature and pressure. The effect of chemical composition is next considered, and here one must pay tribute to the skilful manner in which the author has collected and correlated a large number of empirical relations, laying due stress upon those of greatest generality and theoretical significance. Finally comes an account of the behaviour of binary mixtures and solutions.

The book is written avowedly from the experimental viewpoint, so that a critical discussion of the molecular theory of liquids could scarcely be expected. At the same time, it seems unfortunate that such a discussion was not attempted, even if it only served to emphasise our ignorance of the laws of force between molecules. This, however, would involve a consideration of vapour pressure and latent heat with which Prof. Kremann deals only incidentally, although they, too, may be classed as mechanical properties of liquids. S. S.

Grass Land: its Management and Improvement. By Prof. R. G. Stapledon and Dr. J. A. Hanley. Pp. 159. (Oxford: Clarendon Press; London: Oxford University Press, 1927.) 5*s.* net.

DURING recent years increasing attention has been paid to the improvement of grassland from various aspects, including methods of cultivation, manuring, and the types of grass used for sowing down. Progress has been rapid, and is still continuing, and in this volume Messrs. Stapledon and Hanley have sought to epitomise the present position, though at the same time they fully acknowledge that many of the recommendations put forward are tentative in nature and may need modifying in the light of future experimental results. Their aim is to provide the most precise information possible to enable an intelligent farmer to apply new methods in his management of grassland, wherever such improvement offers prospects of increased revenue. It is pointed out that one of the chief difficulties in estimating the financial value of improvements to date is the lack of adequate information in the form of farmers' costings accounts.

Grassland may be divided broadly into two types, natural and semi-natural, embracing respectively the large un-enclosed areas of moorland, heath, downs and saltings, and fenced-in land associated with the homesteads. The latter naturally offers the greatest opportunities for improvement, the appropriate methods of treatment varying widely according to local conditions.

In many cases manurial applications, to be effective, must be preceded by adequate mechanical treatment, or by the amelioration of soil acidity by the judicious use of lime, notably in very smoky districts. The necessary difference in grazing and meadow treatment is indicated, and information is given with regard to the various methods of renovating grassland and to the production of permanent and temporary leys. A bibliography of selected literature concludes a most useful summary of grassland treatment.

Principles of Soil Microbiology. By Prof. Selman A. Waksman. Pp. xxviii + 897 + 19 plates. (London: Baillière, Tindall and Cox, 1927.) 45*s.* net.

THE demonstration of Schloesing and Muntz in 1877 that in sewage beds ammonia is converted into nitrate by biological agencies, and the further demonstration by Warington that two species of bacteria are involved, followed by their isolation by Winogradsky, turned the thoughts of soil investigators towards the biological aspect of soil fertility.

Naturally, the earlier work was confined to the bacterial population of the soil, and, in text-books published round about 1910, nitrification, nitrogen fixation, and denitrification were the main topics of discussion. Since that date, the subject has gradually assumed a broader aspect, and it has been realised that not only bacteria, but also protozoa, algæ, and fungi are playing a part in the various soil reactions.

In the voluminous treatise prepared by Waks-