sories, to be suitable to small dames. Unless must be remembered that milk at a high tem water power is available, at engine is required perature is all the more liable to go sour from to drive it, for horse power is too unsteady the formation of lactic acid, so that, especially to be relied on, so that the cost of the in warm weather and unless it can be placed machine itself is not all, or nearly all, that has to be considered. I consider, notwithstanding, that a butter-making farmer who milks from thirty to fifty cows may employ one with profit and advantage, particularly when he has the chance of selling his skim-milk. At the same time it must be allowed that on the ancient openand system of raising that on the ancient will form on the surface, and this is objection. open-pan system of raising cream the best of able. Milk heated and cooled in this way will butter is made, wherever the system is intelligently and carefully carried dut. The leading natural temperature only, and the cream will and fundamental requirement in this system is a properly constructed dairy, well drained and ventilated, and whose temperature can be so the larger the globules the somer they rise a regulated as not to vary very much. Provid-ing the room is cool enough in summer, the ed in milk whose globales vary in size, which, regulation of the temperature in winter is a simple matter enough. A room with double walls and an air space, with a ceiling at the square, and an "air-cushion" between it and the roof, and lastly, a felt roof a foot or two above the hard one, and an air space between delicate in aroma, it is essential, I consider, to them, the air circulating freely, will, I have prevent all approach of sourness, and to churn reason to believe, secure inside the room a sweet cream. Acidity in milk is incipient detemperature which will seldom rise above 65 composition, and it is the more delicate fla or degs in any weather to which we are subjecting oils which suffer first of all among the fats in the British Islands, and this immunity from of which butter is composed. Butter made excessive heat is all the more probable if the from perfectly fresh cream is of course pure in dairy has a northern aspect, and is shaded by flavor, but there is not a full flavor in it; and if a large tree or two from the sun's rays. A room so constructed will also be dry, in which event the gases of the milk will pass off into "ripen" by keeping it some days, but keeping it the air, and there is no atm spheric musture sweet all the time. Some persons prefer the to speak of, no vapors, sweet or otherwise, to condense on the surface of the milk as it cools.

temperature of the room does not rise above 65 degs, in the middle of the day. It must be borne in mind always that this question of temperature, closely followed by those of cleanliness, watchfulness, and industry, is of very considerable importance in a dairy. No dairy equipment is complete without a thermometer. The colder the room, especially in summer, the faster the cream will rise, and the more thoroughly. This is the result of natural chemist to the Highland and Agricultural laws. Water, of which milk is chiefly composed, shrinks sooner than fat does under the influence of cold, as also it expands quicker under the influence of heat. This is because it is a hetter conductor of both cold and heat than fat is. And the result of milk being placed in an atmosphere much colder than it is itself at the time, or in much colder water, is seen in the comparatively rapid ascent of the cream. This is simply because fat, being a slower conductor of cold than water is, retains its buoyancy all the longer, and so rises to the surface quicker in a falling temperature of the milk than it does in a stationary one. And it rises all the quicker, within limits, the more rapidly the milk is cooled. This, indeed, is well observed in the Swartz and Cooley systems of milk-setting-the former operating in ice water and the latter in a current of cold water, and both of them in troughs or boxes containing the water in which the cans of milk are placed.

Some persons attach importance to the heating of milk to 130 degs. or so, soon after it is taken from the cow. Intelligently pursued, this practice is a sound one. In the first place, heating will expel the animal odor-the "cowey" smell-from the milk; it will for the time being only 45 per cent. The ammonia fluctuates in gives that form of manure a great advantage checkmate the action of fermentive germs that a corresponding manner-the former class of milk may naturally contain, or that it may have bones may have only 4 per cent. ammonia, and bones are finely ground the nitrogenous matter absorbed from the air; and it will tend to the the latter may have 5 per cent. There is comes rapidly into operation. It forms a suitable dissipation of the peculiar flavor which some always a balance in these two constituents, so food for minute ferments, which hasten its kinds of food-turnips, for instance-impart to that if bones are rich in the one they are cordecay and transformation into ammonia-

remain sweet longer than with co-ling from its rise the quicker. The heating is said to en large the cream globules by coalesence, and indeed, is the case in all qualities of milk.

A cool dairy, then, is especially valuable in summer time, hastenning the rising of the cream and keeping the milk from souring. In order to produce the finest-flavored butter, pure and a full-flavored butter is desired, which is generally the case, it is necessary to let the cream cream to be slightly sour when it is churned, and the souring will make a tough and keep Milk does not become unmanageable if the ing butter, somewhat less attractive in flavor, and which is more easily churned as a rule. But, at the same time, a more admirable butter is made from ripened cream that is still free from perceptible acidity.

BONE MANURES.

By DR. A. P. AITKEN,

Society.

Bones have been in use as a manure for more than half a century, and their use is con-tinually on the increase. There is no manure for which farmers entertain so great a respect one might almost say affection-as bones. Their efficacy as a manure was first brought forcibly before agriculturists in this country from experiments made in Cheshire on pastures which had deteriorated from being long grazed by dairy cattle. The great drain of phosphates on a dairy farm, due to the large amount of that material contained in milk, has already been referred to, and it was not long before it was found that bone and milk were very closely related to each other.

Bones owe their value chiefly to two ingredi ents, phosphate of lime and gelatine, or other nitrogenous matter. About half the weight of dry bone consists of phosphate of lime, and the nitrogenous matter is sufficient to yield from 4 to 5 per cent. of ammonia. The proportions of phosphate and ammonia vary a little in different kinds of bone, so that in hard bones there may be 55 per cent. of phosphate, while in the flat or spongy bones there may be

costly a thing, and too elaborate in its acces milk that is produced by their aid. But it respondingly poor in the other. If they are genuine bones they cannot be rich in both, although they may easily be poor in both if they are damp or contain much earthy matter. as the last of a ship's cargo, and bones gathered from clayey land, usually do.

When bones were first used as a manure they were cheap, and enormous quantities were put upon an acre. They were applied as rough or coarsely crushed bones, and on that account it required a large application to produce an immediate and marked effect ; but all experience has gone to prove that coarselycrushed bones are a wasteful and extravagant manure. The phosphate in bone, and the nitrogenous matter in great measure also, are insoluble, and it is long before a splinter of bone an inch long yields to the solvent forces in the soil. I have picked up numerous frag-ments of bonc in fairly good preservation from a field where they had lain for a quarter of a century, and it requires no argu-ments to prove that such a use of bones is a very extravagant one. The more repidly and thoroughly that bones can be converted into crops the more profitable is it to the farmer. and therefore the practice of applying half-inch bones and crushed bones is speedily dying out. Yet there are still to be found farmers who prefer to use bones in that form, chiefly in order that they may have the satisfaction of seeing with their own eyes that the manure they are applying is really genuine bones. That is no doubt a sati-faction, but it is one for which they are paying a very large interest. It would be a much better investment to spend half-a crown in buying a magnifying glass or convenient httle pocket lens, capable of making things appear four times their natural size. By applying such a lens to eighth-inch bones they would look quite as big as half-inch bones, and their genuineness could be quite as easily ascertained. There are many other uses to which a farmer might with advantage apply his lens. All mixed manure will be found to form interesting objects of observation, and soluble manures also when they have been washed repeatedly, and all the turbid liquid poured off will be found to leave behind an amount of sediment of a coarse kind that will form interesting matter for examination. Cakes and other feeding stuffs may also be examined through a lens with great advantage, and grass seeds will be frequently found to present a most interesting and instructive picture. There is no outlay that a farmer can make that will pay itself better than half-a-crown spent on a pocket lens.

Even roughly-ground bones contain usually a certain proportion of fine bone meal, and it is to the latter that the immediate efficacy of that form of hones is in the main to be ascribed. In laying down land to permanent pasture there may be advantage in having the bones not entirely ground to a fine powder. for the roots of grass weave a web round little particles of bone, and slowly extract nourishment from it for a long period ; but in ordinary rotation cropping the finer the bone meal the more rapid is its action, and the more profitable is its application. Bone meal is the proper form in which to apply bones. It may be objected to very fine bone meal that it is liable to be adulterated, but such adulterations are easily detected by any one acquainted with the use of the microscope.

The presence of nitrogenous matter in bones over all purely phosphatic manures, and when bones are finely ground the nitrogenous matter