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Event and Comment.

Food Production a Major War Service.

AS one of Australia's major contributions to the wartime needs of the United Nations, the importance of food production has been stressed again and again in different ways during the past few months. Australian farmers' increasing output is a credit to all concerned, especially in view of the difficulties under which so many of them are working. Splendid as this effort is, there is need for even greater production in 1944, which is regarded as the critical year of the war. Food is, obviously, among the most vital necessities at the present time, and the maintenance of supplies sufficient to meet Commonwealth commitments has been a huge task and one made harder by the unavailability of many farming requirements and often, also, by seasonal circumstances.

Production objectives for this year have been fixed for beef, mutton, pig meats, butter, cheese, eggs, sugar, wheat, potatoes, and pineapples; also for cotton and tobacco. Every farmer is now urged to grow a bit more to shorten the war.

Early in the war, food was plentiful in Australia while munitions were not. So agricultural implement works changed over to munition production. At this stage, Australia had a "surplus production complex." Then Japan and the United States of America came into the conflict. For Australia, this meant a very great addition to the armed forces in Australia. There were many more mouths to feed. Conditions necessitated the mobilisation of man-power and all our other resources. Despite these circumstances—diversion of labour, materials, and machinery and the depletion of fertilizers and shortage of other essentials—Australia managed to maintain the level of production and, in some cases, actually raised it; but food demands were

ever growing. And now this year there will be very much heavier demands on the agricultural and pastoral resources of this country. Consequently, food objectives providing for substantially augmented production in practically all staple foodstuffs have been set for 1944. Even if these objectives are attained, the additional output will be soon absorbed because of steadily expanding needs. That is why in the fifth year of war the people of Australia are being asked to restrict their use of basic foods and to assist in every other practical way in solving our provision supply problems.

If this food production campaign is to succeed, the complete co-operation of all concerned is necessary. Efforts are now being directed towards easing the rural labour position and to have other agricultural requirements made available so that Australia may continue as one of the main food bases of the United Nations. After all, Britain and our Allies have the right to call on us for sustenance, as we have to call on them for armed assistance and for war material.

The more fighting men who come to the south-west Pacific, the greater will be the demands on Australia's food economy, which must therefore be a factor of very high importance in our general strategy. In fact, it is a fair assumption that the proper handling of food production in all parts of the world will make or mar both the progress of the war and the later establishment of peace; therefore, food must necessarily have a tremendous influence on the saving of our civilisation.

What the British Farmer Has Done.

BRITISH agriculture is certainly pulling its weight in the war. Last year, with helpers in every district, including the Women's Land Army—now 70,000 strong—week-end workers from towns and cities and volunteers of all ages who spend a week or two in organised camps, the farmers of Britain gathered an overall harvest of 100,000,000 tons. The job undertaken by them was to plough and crop and harvest and deliver food to the nation as well as to grow food for their own stock. To do that they took the plough right round the farm, bringing into production thousands of acres in which a furrow had rarely been opened before. Increased production of milk, vegetables, and other field crops has caused a corresponding diminution in beef and mutton production. The additional area brought into cultivation has more than offset, however, the loss of crop land to military and industrial use. Loss of agricultural workers to the Services was another handicap, but the willingness of those remaining to work harder and longer hours and mechanisation of production overcame it. All this could not have been done, of course, without planning and organisation, in which district war agricultural committees took a notable part. These committees made up largely of practical agriculturists advised, assisted, and encouraged farmers when necessary and directed the food production campaign. In doing a splendid job they control and administer reserves of labour, machinery, fertilizers, and other farming requirements. Not only that, but they have taken over and worked badly-run farms and have brought derelict land into profitable production. And through their technical sub-committees they let fellow farmers know what is doing in the way of new developments in machinery and equipment and improved farming practice. Naturally, lessons had to be learned from failures and mistakes, but the facts remain that the people of the Old Country have not starved, their "morale" was never higher, and many thousands of acres of formerly unproductive land is now part of the "Garden of England."

Haymaking.

L. M. HODGE.

(*Continued from page 16 of January issue.*)

HAYSTACKS.

THE frequency with which heavy rains are experienced in Queensland renders it necessary that haystacks be built on a site above flood level, well floored, soundly constructed, and securely roofed. A suitable base may be constructed from bush timber by laying stout saplings about 8 inches apart across bedding logs of 10-inch diameter spaced 6 feet apart on the site of the stack. Alternatively, a permanent floor may be made with loose stones built into a level platform about 1 foot high.

The shape and the size of the stack should be determined before building is commenced. Round stacks are convenient for small quantities of hay, but require more skill in topping off than do square or rectangular ones. As a rule, the best type of stack is that which exposes the least possible amount of hay to the weather, and the rectangular stack satisfies this requirement.

In determining the size of the stack to be built, the tonnage of hay to be stacked has first to be estimated. Working on this estimate, and using the following table, the amount of space to be provided may be calculated:—

CUBIC FEET PER TON OF HAY.

Period.	Oats.		Wheat.		Lucerne.
	Sheaf.	Loose.	Sheaf.	Loose.	
Freshly stacked	350	400	400	500	400–450
One month after stacking	300	350	350	400	350–400
One year after stacking ..	300	325	325	350	300–350

The required size of stack for an estimated amount of hay may be ascertained by reference to the following table, which shows the length

of stacks of various sectional dimensions required to store 1 ton of average hay:—

Average Width.	Height to Eaves.	Height of Pitch.	Length for One Ton.
Feet.	Feet.	Feet.	Feet.
10	8	4	4·0
10	10	5	3·2
12	10	8	2·4
12	12	8	2·1
13	10	8	2·2
13	10	10	2·0
14	10	10	1·9
14	12	10	1·7
14	14	10	1·5
15	12	10	1·6
15	14	10	1·4
16	12	10	1·5
16	14	10	1·3
18	12	10	1·3
18	14	10	1·2
20	14	10	1·0

Where large amounts of hay are being conserved it is advisable, in order to lessen the risk of total loss by fire, to build separate stacks suitably spaced and each containing no more than 50 tons of hay.

Building Haystacks.

It is important in constructing haystacks, whether of loose or of sheaved material, that the centre be higher than the edges upon the completion of each layer. The straws throughout the stack should tend downwards and outwards, in order to prevent beating rain making its way into the stack from the sides and to divert to the outside any water which may penetrate the roof.

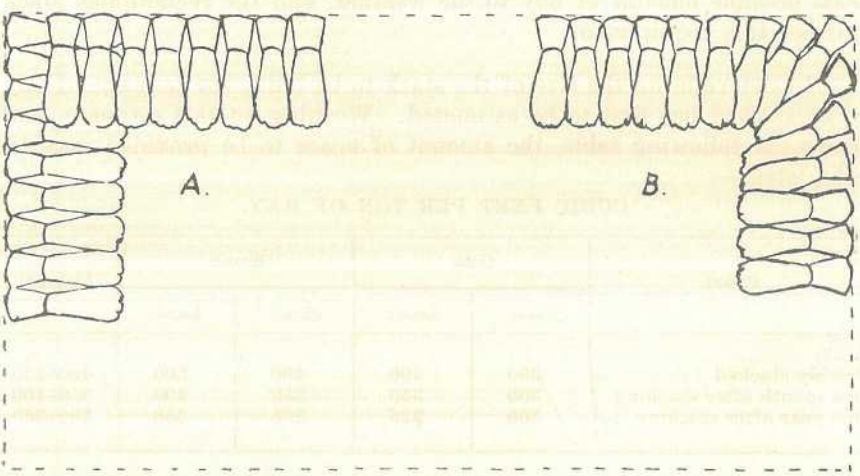

Plate 30.

COMMENCING A STACK OF SHEAVED HAY.

When stacking sheaved hay, a bed of loose material, such as straw or loose hay, should be laid on the floor so as to give a rise of about 18 inches from the edges to the centre. Stacking of the sheaves is usually commenced at the edge of the stack. The outside layer consists of sheaves laid side by side as closely as possible with butts outward and their line accurately defining the ground area of the stack. The corners may be turned in either of two ways, both of which are illustrated in Plate 30. The method shown at B makes the stronger corner, unless the sheaves are very short. The longest sheaves should always be used for the outside lines, and particularly for the corners, as they lock more securely than short sheaves.

The second row is placed shinglewise upon the first, butts outward, leaving about 1 foot of the first line exposed. This is a binding row and follows the outside row right round the stack. Successive lines of sheaves, each one nearer the centre, follow until the centre is reached, where a line of sheaves laid lengthwise makes the centre line solid.

The stack is built in this way to the eaves, which are formed by projecting the two topmost outside lines of sheaves 4 inches to 6 inches beyond the edge of the stack. The pitch of the roof is then made by laying each successive outside line of sheaves inside instead of directly above the last, the floor of the stack thus becoming smaller with each successive layer of material, until the final layer is only as wide as a sheaf is long (Plate 31, fig. AA), and the sheaves, placed head to butt, overlap each other completely.

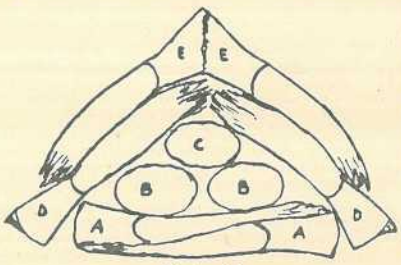

Plate 31.
RIDGING AND CAPPING A STACK OF SHEAVED HAY.

The first layer of the ridging sheaves (Plate 31, fig. BB) consists of solid, well-bound sheaves laid lengthwise and fastened together in pairs with a hayband to prevent them from spreading. Upon these are laid a single line, butts overlapping heads, to form the ridge (Plate 31, fig. C).

The capping sheaves consist of a line (Plate 31, fig. DD) laid butts down against the ridge so that their heads overlap on the ridge line C. These should, for security, be held in place with stakes pushed through them at several places and connected with a line of binder twine. The final capping sheaves (Plate 31, fig. EE) are placed astride the lines DD, butts upward. These are fastened together with a hayband in order to make them firm and secure at the peak. To make the hayband, a handful of hay is bent out on each side of the string tying the sheaf and twisted to form a hayrope attached to the string band of the sheaf. The end of this hayrope is then twisted into the string of the companionate sheaf and the two are firmly tied together and may be placed astride the ridge. When completed, the whole capping should be made secure with stakes and twine.

Thatching and Roofing.

However soundly it may be constructed, a haystack may be partially or wholly ruined unless it is secured against entry of rain water. A straw thatch may provide insufficient protection against heavy rains, unless the work is done by a highly skilled thatcher, and it may therefore be advisable for all stacks built in the open to be provided with

a galvanised iron roof, more particularly if the hay is not to be used for some considerable time. For a gable-roofed stack, such as has been described, the iron may be nailed to 3-inch by 2-inch hardwood battens and capped with ridge-capping. A 10-feet sheet of iron on each side will cover a stack 15 feet in width, provided the pitch of the roof does not exceed 7 feet.

A turtle-backed roof (Plate 32) has given good results in Queensland. It consists of curved 24-gauge corrugated galvanised iron, the curve being formed by bolting two 10-feet sheets, each machine-curved to a 12-inch spring, end to end. This union forms an arch having a span of approximately 15 feet, with a height of 42 inches. The advantages of this roof are ease of construction and handling and security from both wind and rain. The cost of a turtle-back roof to cover a 50-ton stack is about £20.

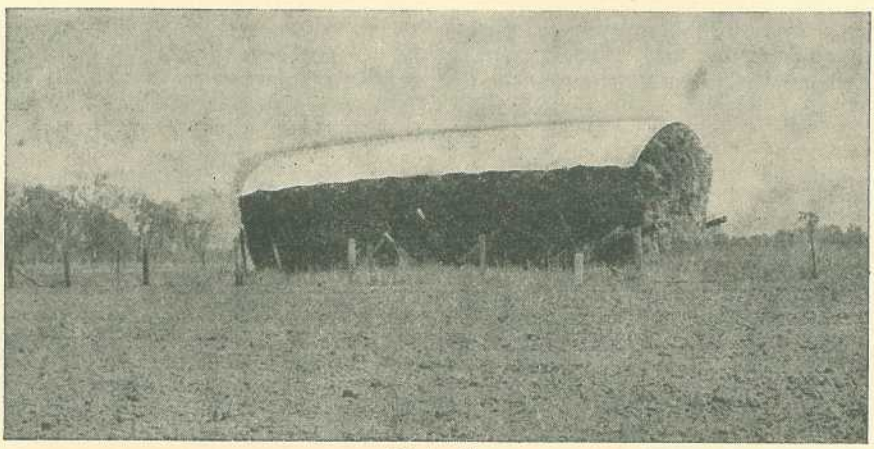

Plate 32.
A 50-TON HAYSTACK WITH TURTLE-BACKED ROOF.

It is necessary to punch and assemble this type of roof on the ground. A convenient stand for this purpose may be made by fixing a stout rail parallel to a level piece of ground and at a height of 42 inches above it. The rail should be about 12 feet long, in order to carry three pairs of sheets of iron and to leave sufficient working room. The pairs are bolted together, as shown in Plate 33. When three pairs have been joined, the rear or first pair is unbolted and the sheets numbered 1 and 1A, care being taken that the lettered number is always on the same side. Another pair is then fitted to the working edge and the procedure repeated until the whole roof has been assembled, numbered, and taken apart ready for building on top of the stack.

When punching the bolt holes it is advisable to avoid making them too neat for the $\frac{1}{4}$-inch bolts, as some play is necessary to permit the bolts to be passed through the several sheets of iron when working on the yielding stack. The sheets are joined at the top of the arch by three bolts, the outside bolts also holding the overlap of the neighbouring pairs, an overlap of 6 inches being given. Two bolts are inserted down each side of each 10-feet sheet, so that each complete arch is joined to its neighbour by five bolts.

The prepared sheets are hauled on to the stack in a suitable rope sling, and the builder bolts the first pair together, with the outside and centre bolts at the top of the arch. The next pair is joined by the centre bolt only, before the set is joined to its neighbour. Two men are required for this work.

Care must be taken to secure the turtle-back roof against sudden winds while it is being fixed. Cables of strong galvanised fencing wire should be passed over the roof at intervals of 4 feet and sufficient weight suspended from each end. The wires and weights should be left on the stack in order to hold the roof securely, but the weights must not be permitted to reach the ground as the stack settles.

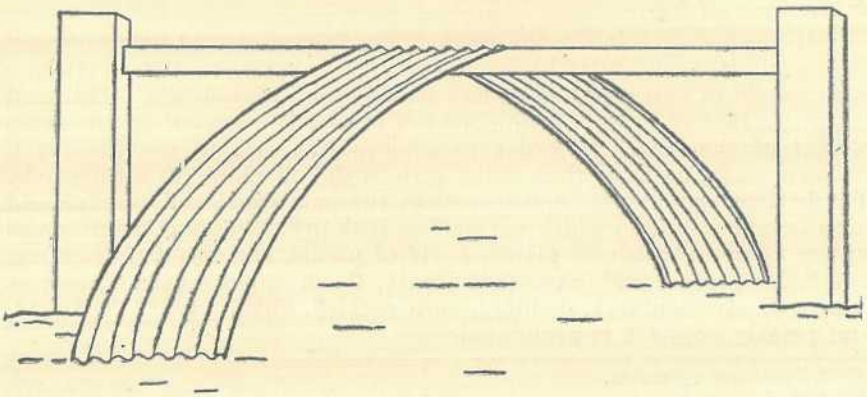

Plate 33.
Bolting of Iron Sheets.

Protection from Vermin.

Haystacks may be protected from mice by surrounding them with a fence constructed of 6 feet by 3 feet plain galvanised iron sheets running lengthwise with the edges let into the ground to a depth of 6 inches. The fence is generally built with a lean outwards of not less than 6 inches from the perpendicular. It is advisable to solder "eyebrows" at the tops of the corners. While galvanised iron fencing is expensive, it is extremely durable.

BALING HAY.

For marketing purposes hay must be put into bales, unless it is chaffed and bagged. In Queensland, the market demand normally is for chaff rather than hay, but for drought-feeding of sheep baled hay is widely used. Where hay is conserved on the farm or pastoral holding, stacking in the baled condition is preferable to storage as loose hay, since baled hay is more conveniently handled, transported, stored, and fed to stock in the paddock.

Baling of hay may be carried out in the field from windrows, cocks, or stooks, but in cases where it is desirable to remove the hay to shelter as rapidly as possible, baling is most conveniently done from the stack. In order to avoid losses due to heating under pressure in the bales, the hay should not be baled in the field until the moisture content has been reduced to a somewhat lower level than the maximum permissible in loose hay at the time of stacking. The regulations under "*The Stock Foods Acts,* 1919 *to* 1935," limit the amount of moisture allowed in

hay offered for sale to 12 per cent. by weight, unless the actual amount is declared on the invoice and at the time of sale.

There are two main types of hay press in use—namely, the box, derrick, or dump baler and the perpetual press. In making bales with the former type of press, the hay is fed into the press in several portions or charges, and each portion is compressed separately by a plunger or ram. Unless special care is exercised in filling, the hay tends to become somewhat tangled in the bale and cannot be easily separated into portions when being fed to stock. For this reason the hand-pressed bale, which results from continuous pressure in a perpetual press on a heap of hay in a frame, is favoured by purchasers intending to feed the commodity in the form of hay.

In preparing hay for the market, the farmer should bear in mind the regulations under "*The Stock Foods Acts,* 1919 *to* 1935," dealing with weight of battens on bales and with foreign ingredients. The total weight of battens on each bale must not exceed 10 per cent. of the gross weight of the bale. In order to achieve this and to provide for a uniform pack, no more than eight battens should be used on each bale. The battens should not be longer than the bale itself and they should not exceed 3 inches in width nor half an inch in thickness. The presence in hay offered for sale of plants, parts of plants, and seeds of Bathurst burr*, Noogoora burr†, castor oil plant‡, thorn apples§ (also known as datura or stramonium), dodder‖, corn cockle¶, khaki week**, poppy††, and prickly poppy‡‡ is prohibited.

* *Xanthium spinosum.*
† *X. pungens.*
‡ *Ricinus communis.*
§ *Datura* spp.
‖ *Cuscuta* spp.
¶ *Agrostemma githago.*
** *Alternanthera repens.*
†† *Papaver* spp.
‡‡ *Argemone mexicana* var. *ochroleuca.*

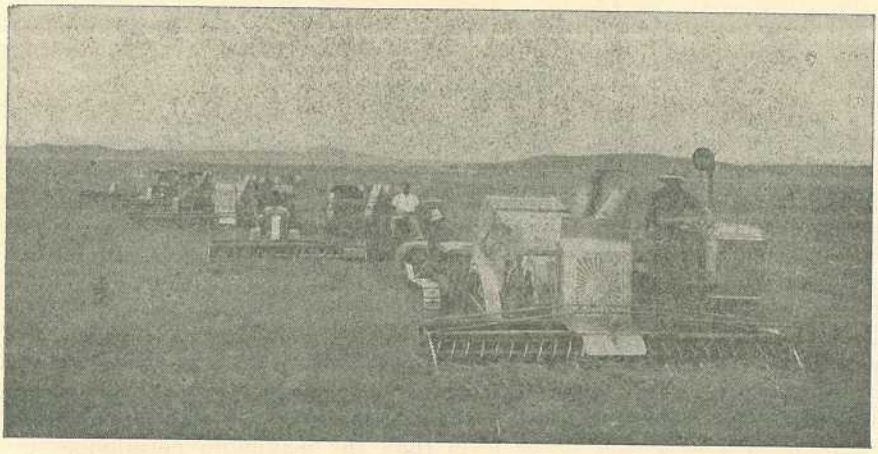

Plate 34.
A WHEAT HARVESTING SCENE ON THE DARLING DOWNS, QUEENSLAND.

Cotton Harvesting.

W. G. STEELE, Instructor in Cotton Culture.

MANY cotton crops are now approaching the harvesting stage, and it is emphasised that care and thought expended on the harvesting operation will be well repaid. With the present shortage of labour, many growers will probably find it necessary for their families and themselves to pick more of the crop than in normal times. It will be advisable, therefore, in such cases to commence harvesting as soon as reasonable tallies can be obtained. Usually this would be when there is approximately 200–300 lb. per acre of open cotton or an average of four to six well-developed open bolls per plant in a field with a normal stand of plants. By starting then, the picking can be completed before there is a large number of open bolls per plant, thus reducing the possibility of storms damaging much of the crop.

HAND PICKING.

Cotton, when it first matures, has a brightness or "bloom" which must be preserved if top grades are to be realised; hence, it is advisable to harvest the cotton before rain and sunlight have dulled its colour. Prolonged exposure to the weather may badly stain cotton and also cause it to lose weight; furthermore, strong winds tease out the locks so that dust and trash are impregnated in the fibres, thus increasing the difficulty of cleaning at the ginnery and thereby lowering the grade of the resultant lint cotton. (Plate 35.) In addition, loss of crop is often brought about by the locks being blown on to the ground, where they become so dirty and discoloured that they should not be harvested.

On the other hand, care should be taken not to harvest any cotton which has not had time to dry out properly after opening. This "green" cotton, as it is called, has a characteristic shiny, matted appearance, which is easily recognised amongst the more mature cotton in the bale. The fibres of green cotton are usually cut considerably during the ginning operations and the resultant lint is of a type unsuitable for many spinning requirements, which necessitates it being sold at a reduced price. Moist, green seed cotton also tends to sweat and thus stain any cotton with which it is packed in a container. This also applies to seed cotton which has been wet by rain or heavy dew. Cotton which has been wet by rain should be allowed to dry out for two or three days before it is picked. This also gives the sun and wind a chance to

fluff out the matted fibres, thus making picking easier and also improving the appearance of the cotton owing to the bleaching action of the sun. Where pickers are employed, drying is especially important as the added moisture can cause a considerable increase in weight, for which the grower has to pay. Where heavy dews are experienced and the cotton contains an excess of moisture for the first few hours in the morning, it is necessary to spread the contents of the picking bag on to suitable containers—such as spare bales at the end of the rows. If this cotton is turned once or twice during the morning it will be dry enough to bale up with the remainder of the day's pick.

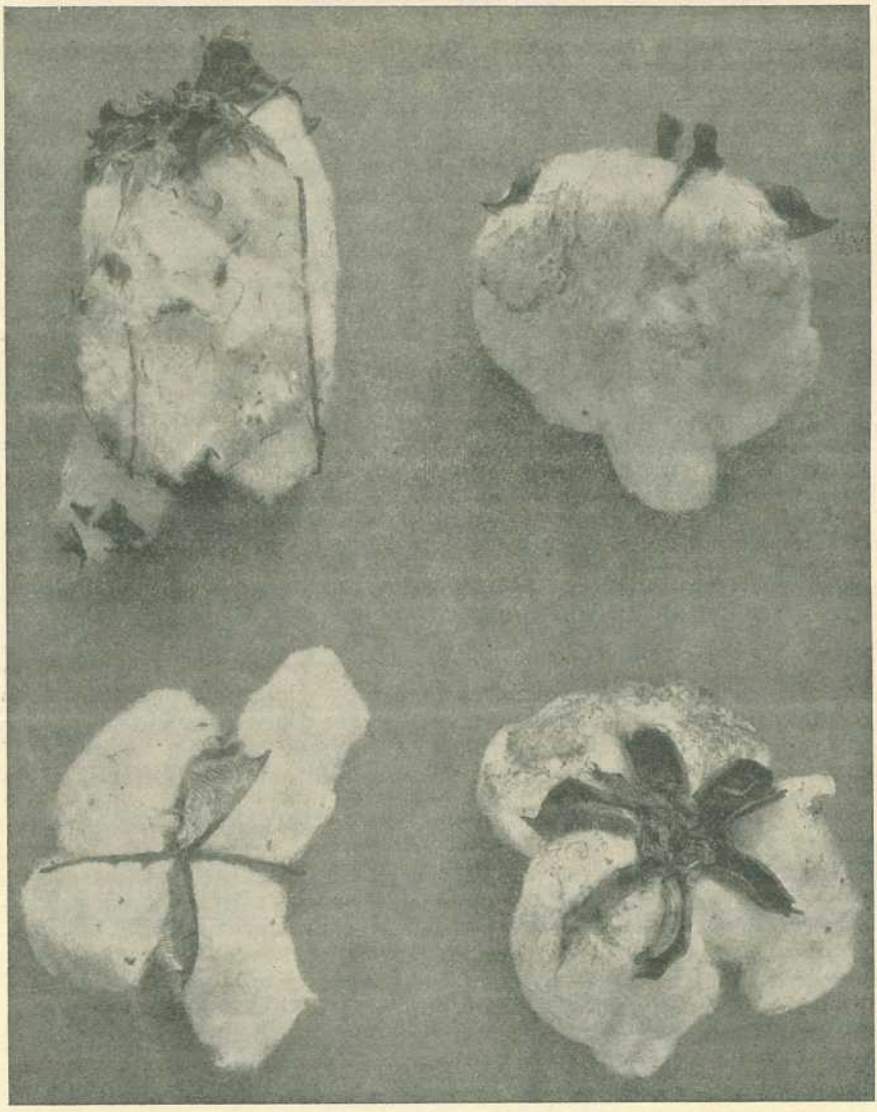

Plate 35.

ILLUSTRATING COTTON WHICH HAS BEEN LEFT UNHARVESTED TOO LONG.

Particular care should be taken to see that no hard, dirty, or diseased locks are picked. (Plate 36.) Such locks, although forming only a small proportion of the total cotton picked, when scattered throughout a bale will greatly reduce its value. A fairly safe rule is to pick only cotton which is fluffed out, as in this way diseased, immature locks—which are usually composed of matted fibres—are eliminated. A fair amount of leaf in the sample is not highly detrimental provided it

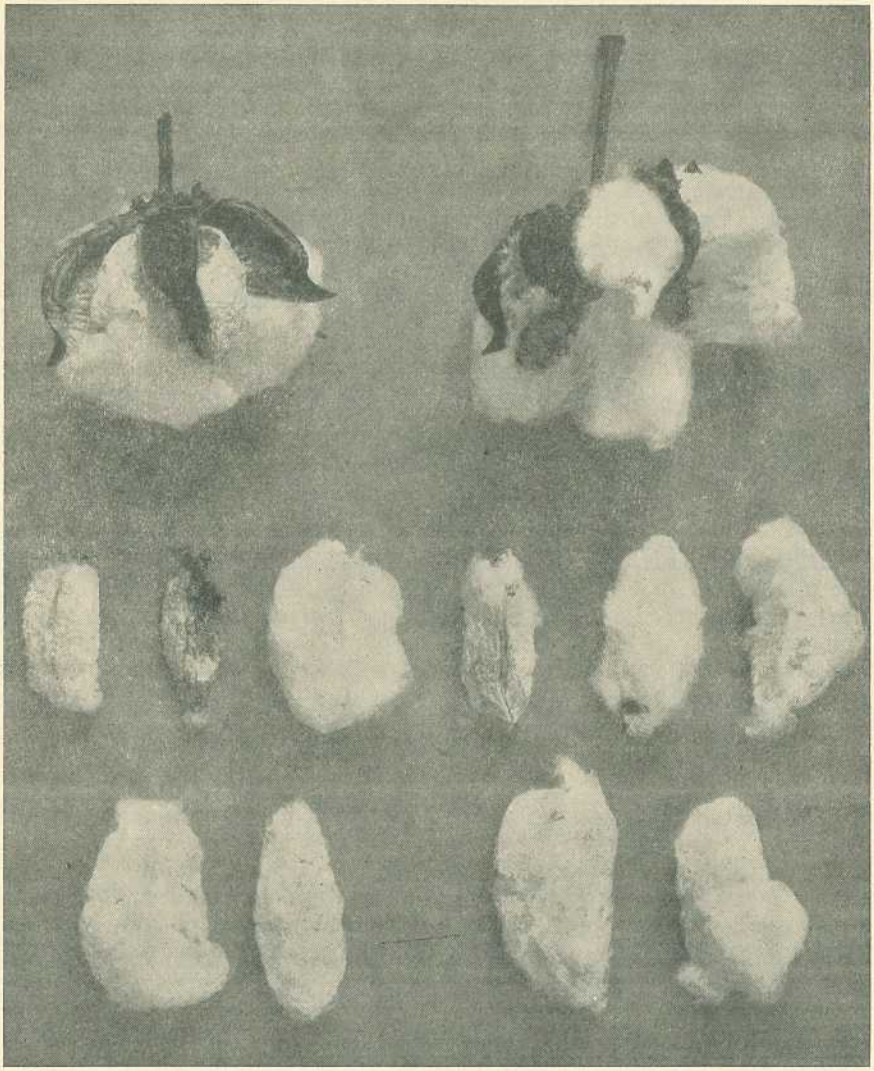

Plate 36.

ILLUSTRATING LOCKS OF COTTON THAT SHOULD NOT BE PICKED.—The locks arranged below the bolls are comparable with those contained in the bolls. None of these locks should be included in mature hand-picked cotton, as they are so much waste and the fibres of the fluffed-out locks are soft. During the ginning operations they would be cut and mixed with other fibres, thus giving the rest of the cotton a wasty appearance which will reduce the value of the whole bale of cotton.

is not too fine. Large pieces of leaf can be removed by the cleaning processes at the ginneries, but the finely crushed up particles become entangled in the fibres and are difficult to remove. Some pickers have the habit of squeezing the cotton between the hands to make a smaller bundle before placing it in the bag—this crushes the leaf or dried bract into smaller pieces and is, therefore, not advisable. Green leaves should never be included in the picking bags, as the natural oils present in the plant tissues will badly stain cotton with which they come in contact.

Every effort should be made to pack only a uniform grade of seed cotton in the container forwarded to the ginnery. This will not only enable a high standard of efficiency of grading to be maintained but will also expedite the carrying out of the grading operations, which is an important factor—especially during rush periods in the ginneries. In addition, the grower is ensured of receiving the full value of the cotton in each container. Where mixed lots of cotton are packed in a container payment is made on the basis of the lowest grade and staple length contained therein. The grower has to exercise care, therefore, in not only segregating the pickings of his crop into the different grades of cotton but also into the different staple lengths and qualities.

Unfortunately, on most farms considerable variation may exist in the quality and length of staple of cotton grown in various parts of a field. For instance, plants growing on deep, sandy spots or on hard clay patches, where most of the rain runs off, will in dry seasons produce cotton with a weaker fibre and probably shorter staple than will the more moisture-retaining portions of a field. Also, the lower parts of slopes, where the gradient lessens and the rains have a better chance of penetrating, will normally produce cotton of better quality and length than further up the slope, where run-off is greater and consequently the plants receive less moisture. Differences of up to 1/16 of an inch have been observed in the staple length of cotton under these circumstances. In some seasons, where the crop has been growing on a restricted water supply in portions of a field, the bolls will be forced open earlier than in the rest of the field. These patches should be picked as soon as sufficient cotton is available, as this cotton may be sufficiently weak and short to make it advisable to segregate it from the remainder of the crop.

It is advisable, therefore, to pick and bulk together the cotton from portions of a field where the crop has developed under similar conditions and bale this cotton separately from that harvested from other parts of the area. It is not feasible, of course, to take note of all small irregularities which exist in a field, but in the course of the season's cultivating the grower is able to form a fairly good idea of where his best cotton is likely to be produced and can accordingly mark off these areas. Where the field contains very long rows it may be awkward to harvest these areas separately under the usual methods of baling the cotton, but the use of a portable baling press will greatly facilitate the baling of cotton from these separate areas.

SNAPPING.

Under normal circumstances this method of harvesting cotton should not be used until the plants have been killed by frosts. Prior to this, the moisture present in the plant toughens the stems of the bolls, thus

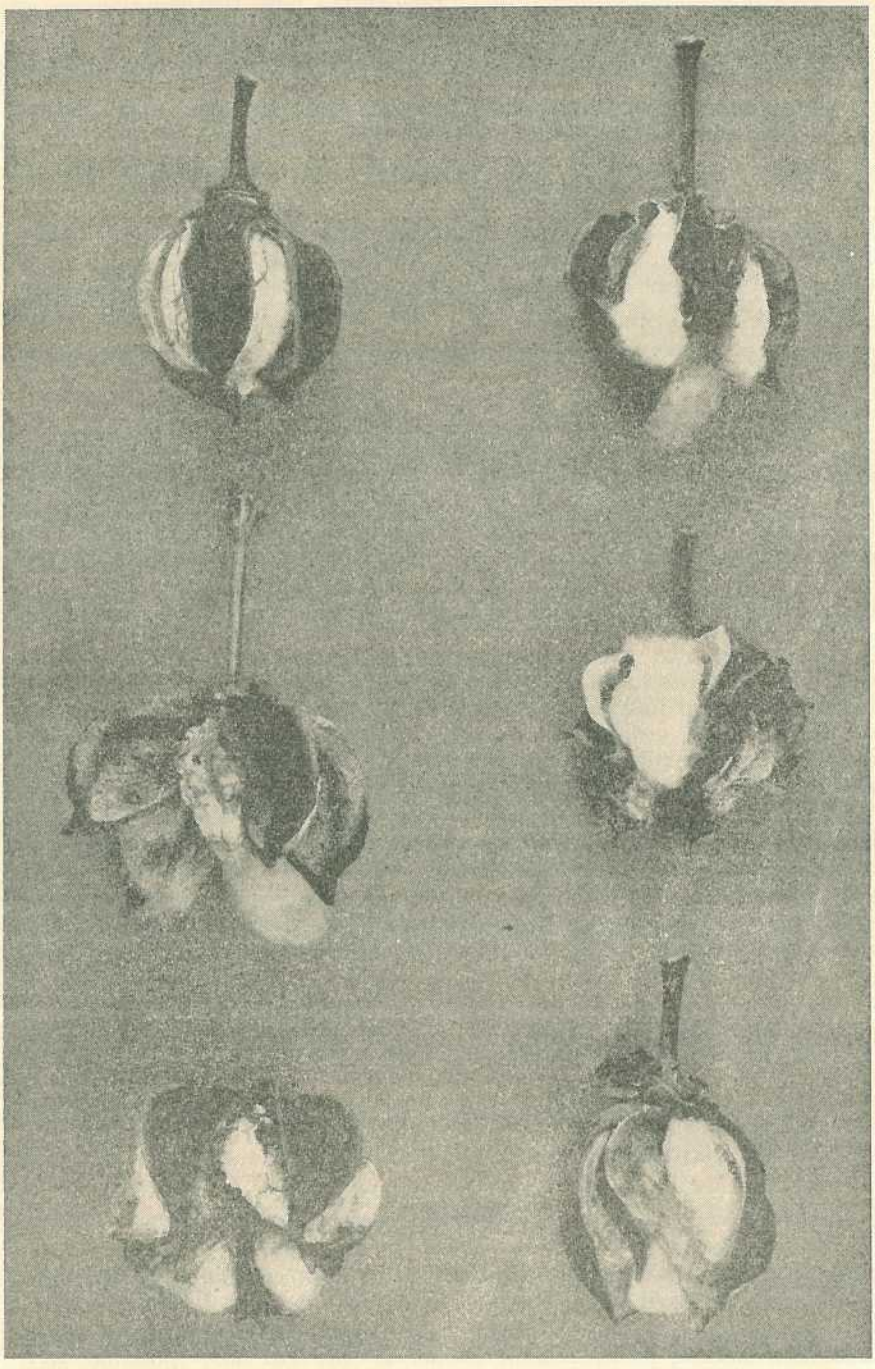

Plate 37.

BOLLS THAT SHOULD NOT BE SNAPPED.—The fibres of the few locks they contain are so soft that the ginning operations would twist and cut them so badly that they would seriously lower the quality of any good cotton ginned with them. Much snapped cotton is ruined each season by the inclusion of such bolls, and the sending of such rubbish to the ginnery should definitely cease.

necessitating a very strong pull to remove the boll, thereby slowing up the snapping, and, in addition, the plant is often badly damaged through whole branches being torn off. The moisture present in the partially dried out boll is also a handicap in that the grower pays for the picking of a large amount of unprofitable material. An additional disadvantage of moisture in the snapped material is that it causes "sweating" in the packed container, which greatly increases the difficulty of properly cleaning the cotton at the ginneries.

In general, snapping cotton lowers the grade, so that any saving which may be obtained by using this cheaper method of harvesting is offset by the lower values received for snapped cotton. The lowering of the grade of snapped cotton is also accentuated by the fact that immature and diseased bolls are usually included in the snapped material, as the picker as a rule does not discriminate between sound and partially diseased bolls (Plate 37). Snapping may result, therefore, in considerable unprofitable expenditure being incurred by the grower. Firstly, he pays for picking material for which he receives no return, as the cleaning machinery at the ginnery rejects all the waste and the grower is paid on the weight of seed cotton which is produced from his snapped material. In addition, he sends away a greater bulk of material than if the cotton had been hand picked, which entails additional expense for carting to the railway station, more wear and tear on his bales, and also heavier treatment costs at the ginnery.

Under certain circumstances, such as where only a very light top crop has been produced or where the main crop has been unavoidably left unpicked so long as to become badly weathered, it may, however, be found more economical to snap than to hand pick. When the bolls have been exposed to the weather for any extensive length of time the stems become brittle and the whole burr is likely to come away in the hand when an attempt is made to pick the cotton in the ordinary way; this slows the picking to such an extent that payable tallies cannot be obtained and either higher rates must be paid for a clean pick or the crop must be snap picked. In this case, it is probably preferable to snap as even if a clean pick at the increased rate were considered payable the amount of burr which would still get into the picking bags would cause a reduction of the grade of the cotton.

Unless there is a good reason for snapping the main crop, clean picking is preferable; but the top crop of bolls, which as a rule contain cotton of a poorer quality, may be snapped. This top crop would normally have to be picked at the rate ruling for a clean-up pick and the difference between this price and that for snapping makes it advisable to snap such cotton.

BALING.

Reference has been made earlier in this article to the need for packing a uniform grade of seed cotton in each container, so that this point needs no further emphasis. An important point to observe, however, is to make sure that all stray locks of cotton are cleaned out of the container before it is refilled so as to prevent any possible seed admixture from this source.

There is a tendency among some growers to stamp as much cotton as possible into each container so as to reduce the number of them

required to forward the crop and thereby cut down cartage costs. This is not advisable, however, for the continued tramping and compressing of the cotton forces the pieces of trash and dirt more deeply into the locks, with the result that cleaning of the cotton both prior to ginning and spinning is rendered more difficult than if the seed cotton had been loosely packed to weigh roughly 470 lb. per bale. This weight also assists in the ginning operations in that three bales or wool packs of seed cotton will contain the equivalent of one bale of ginned cotton, thereby enabling the changing from one grade of cotton to another to be made more efficiently.

The usual type of baling stand, where a frame is erected and the wool pack is suspended by four pieces of wire, works satisfactorily, but as picking progresses and the scene of operations is removed further and further from the baling centre long hauls may be involved in large fields. A simple type of press mounted on a slide has many advantages, as it can be moved along the headland and thus reduce the carrying of the bags of cotton to a minimum. If the rows are very long the press can be located half-way down them and then moved across the rows in the same manner. A press of this type can be easily constructed with 4 by 1 or 6 by 1 hardwood for the sides and 4 by 2 or 4 by $1\frac{3}{4}$ for the rails. It is made on the gate principle so that it may be taken down and stored flat if desired. A big advantage of a press is that the sides of the press take the strain when the bale is being packed so that bales last longer and retain their shape. A firm, square bale is more easily handled and stacking on trucks and railway waggons is greatly facilitated.

It is recommended that the grower's name, address, and registered number be branded on one side of the bale only and in such a position that it can be easily read when standing on its end. When the grader cuts the seam of the bale at the ginnery he makes the cut as he stands facing the brand and always on the same side. If the brand is placed on only one side of the bale the cut will thus be made down the same seam. When this seam has become too worn the brand can be obliterated and another face branded. The grader will then commence on another seam, which will be used as long as possible. In this way, more of the seams are kept intact and the bale remains in good shape, even if it is subjected to extensive usage.

The life of the bale will also be prolonged if the cut seams are resewn with a loose stitch that will allow the seams to separate slightly when the bale is repacked. This will enable the grader to cut the sewing string each time without damaging the bale.

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Packing Grapes for Market.

J. H. GREGORY, Instructor in Fruit Packing.

CAREFUL handling during harvesting is an essential preliminary to the satisfactory packing of grapes for market.

Plate 38.

Showing the method of placing all stalks upward in the picking basket so that bunches can always be handled by the stalks without touching the fruit. This assists in preserving the natural bloom on the fruit.

HARVESTING.

Grapes should be picked in the cool of the day and never while still wet by rain or dew. While being picked, the bunches should be trimmed of all small, damaged berries, care being taken all the time to keep the fruit as cool as possible. Large, roomy baskets make excellent picking containers, and when trimmed the bunches should be placed in these, stalks upward. (Plate 38.) The bunches should always be handled by the stalks in order to retain the natural bloom on the fruit. The baskets, when full, should be placed in a cool, shady position pending transport to

the packing shed. At the shed the bunches should be examined a second time, and any damaged berries missed at the first inspection removed. They should then be spread out on a flat table (Plate 39), on the cool side of the building, again taking care to place them carefully with the stalks up. This will assist in keeping the fruit cool, and also enable the packer to quickly select any particular size or type of bunch which he may need to fill a particular portion of a layer when packing.

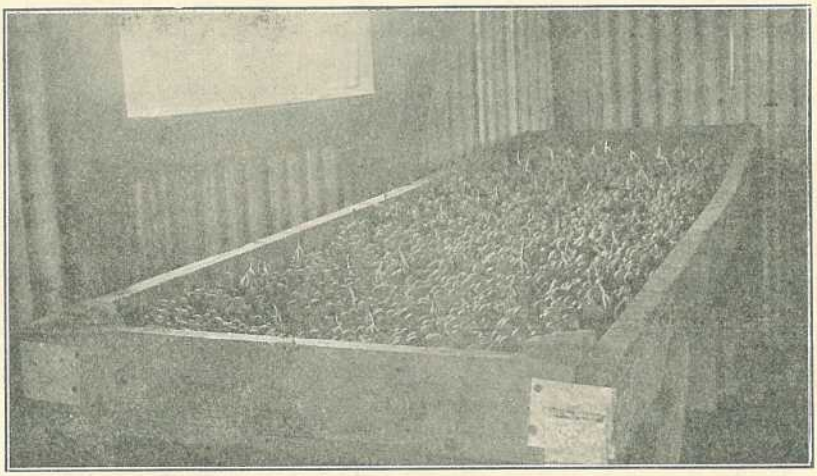

Plate 39.

Fruit spread out on the table prior to packing. Again notice the way all stalks are placed upwards to permit easy handling of bunches.

SWEATING OR WILTING.

It is advisable to sweat grapes for about twenty-four to forty-eight hours before packing. This is done by storing the fruit in a cool shed where the air has free circulation. Weather conditions have an effect on the sweating period, grapes in warm weather taking less time than in the cooler periods. After sweating, the skin of the fruit becomes tougher and more pliable, enabling it to be handled with greater ease and less risk of cracking the berries or damaging the fruit at the stalk. Sweating

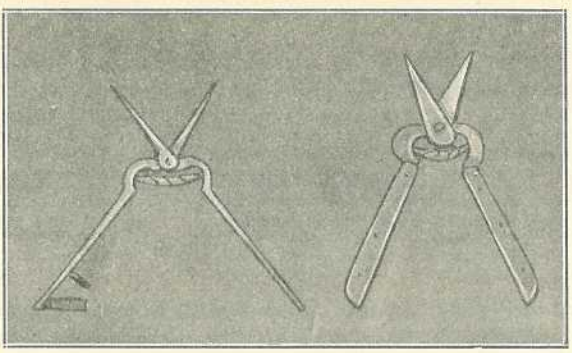

Plate 40.

Types of grape trimming clippers.

also helps to eliminate slackness in packing which is likely to develop during transit through shrinkage when bunches are packed without having been sweated.

PACKING.

Containers.

There are two types of half-bushel cases in use and a quarter-bushel case. Bushel cases are not recommended. The dump half-bushel, 18 inches long by 7⅛ inches wide by 8⅜ inches deep, is a good container, but the half-bushel standard case, 18 inches long by 5¼ inches wide by 11¾ inches deep is better. This container when in transit has not the same weight of fruit pressing on the bottom layer as the half-bushel dump case, the "standard" only having 5¼ inches of fruit as against 7⅛ inches in the "dump." This is a factor for consideration where fruit is sent to distant markets. A quarter-bushel case is also used and is very popular on some markets. Growers are advised to consult with their distributors before using this package.

Selection of Fruit.

Careful selection of bunches also is an important factor in successful long distance marketing. Large, loose types of bunches should always be selected. Tight bunches are unsatisfactory, as they are harder to clean and trim without damage to the berries and should be sent to the nearer markets. Often the large, tight bunches contain many blemished berries in the centre of the bunch which can only be satisfactorily removed by cutting the bunches into sections. This is undesirable, as the value of the fruit is depreciated by reducing the size of the bunches. Bunches should be selected containing only large, even fruit. Bunches of small fruit are of low commercial value. It is advisable to leave a length of the stalk attached to the bunch when picking. This assists the packer when handling the fruit. Bunches with long stalks appear to carry and open in better condition than those with stalks clipped short.

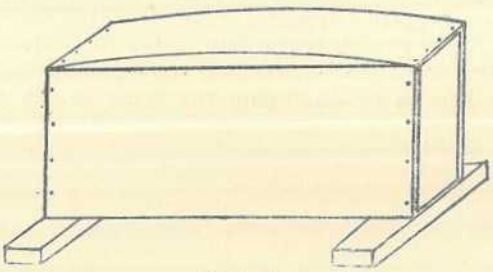

Plate 41.

Method of placing two pieces of timber on the floor of shed. This makes a good solid nailing down bench, and permits the bottom of the case as well as the top to bulge slightly when the lid is nailed on.

Packing.

The same system of packing is adopted in all types of cases. Packers should endeavour as much as possible to keep all stalks to the centre of the box so that when opened the cases on either top, bottom, or sides show a surface of fruit with practically no stalks visible. (Plates 42 and 43.) This style of packing is easily done. The case should be

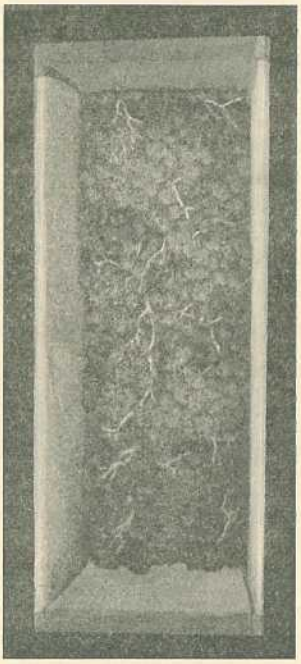

Plate 42.

Method of placing the first layer. Note how all stalks are placed inwards and upwards so that only fruit will show if the bottom board of the packed case is removed.

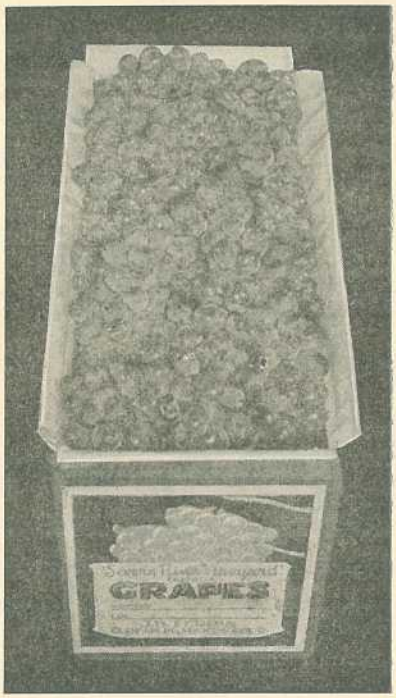

Plate 43.

Finished case before nailing down. Note how all stalks are carefully hidden. If care is taken, all sides of the case will open up showing fruit only.

lined with clean white or coloured paper and the fruit carefully placed in the case in layers. The first layer is started by placing the points of two bunches in the corners of one end of the box with the stalks to the centre of the layer but facing upwards and inwards. (Plate 43.) Bunches are then placed point first into the corners made by these bunches and the side of the box until the layer is finished. The space, if any, between the two lines of grapes of the first layer is then filled by placing bunches into the space with the points to the bottom and the stalks up. This presents a level surface of fruit free from stalks to the bottom of the case. The process is carried on until with the dump case the case is half filled, when the fruit is shaken into position by light bumping. Battens should be placed beneath the ends of the case while this is being done. The standard case should have the fruit eased into position when about one-third full and again when about three-quarters full. The case is finished by packing the fruit in layer by layer, bringing the fruit to a height of 1 to 1½ inches above the top of the case. Battens are then placed under the ends of the case, the paper folded over, the lid held in position with a gentle pressure placed on the fruit and the case. If sufficient care is taken, the bunches will not be injured in any way. After easing the fruit into position, and before finally nailing down, the lid should be removed and the top

of the case inspected. If by mischance any grapes are cracked these should be carefully clipped and removed. The secret of success in grape packing is to have the fruit tightly packed in the case to prevent movement whilst in transit. Movement in the finished case causes damaged and wet fruit, making consignments wasty and unsaleable.

COLD STORAGE.

Not every variety of grapes grown in Queensland is suited for cold storage. The best varieties in their order of merit are:—White grapes—Waltham Cross and Cervant; black grapes—Purple Cornichon, Black Malaga, and Black Muscat; red grapes—Red Malaga and Flame Tokay. This preference is based on the results of export consignments to the East, New Zealand, and Canada, and experimental packages stored in Brisbane.

After analysing the results of experimental consignments, the periods for which the several varieties may be stored with safety are:—Black Muscats, four to five weeks; Waltham Cross, five to six weeks; Purple Cornichon, Flame Tokay, Red Malaga, Black Malaga, and Cervant, seven to eight weeks.

It must be stressed that safe storage can only be achieved by every attention to careful handling.

Lining Paper.

Lining paper, if procurable, should be used with all packs. To save time, plain white or coloured paper cut to the correct size to fit the case should be used. For the ¾-bushel, paper 12 inches by 20 inches wide is suitable and leaves a good margin for overlapping. The paper should be placed in the case neatly, as damaged or torn lining paper creates a bad first impression when fruit is being examined.

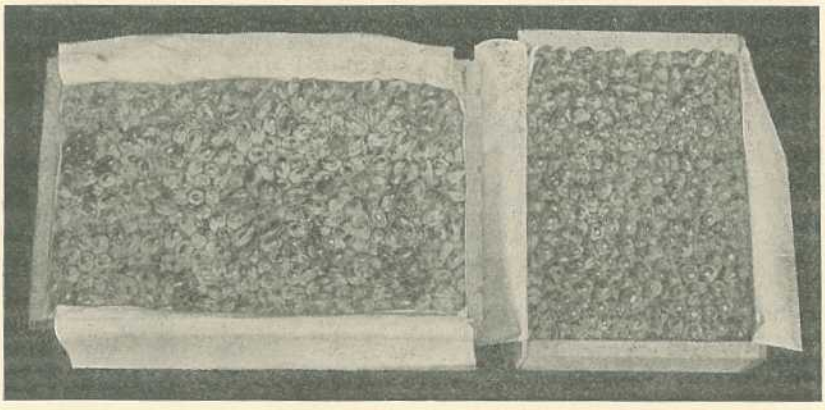

Plate 44.

Standard ½-bushel and ¼-bushel case opened on the side showing the absence of stalks when the fruit is packed correctly.

Packing in Woodwool and Sulphite Paper.

Packing in woodwool and sulphite paper will present little difficulty. The case is first lined with paper, and then a pad of woodwool is placed on the bottom and around the sides of the box. The clipped bunches are then carefully wrapped in the sulphite paper and placed closely

together in the box. Only large-sized bunches should be used. Where bunches are small, two at a time can be placed in the one sheet of paper. This is preferable to wrapping small bunches separately. The packer should aim at having one layer of fruit in the case. From this it will be seen that only large bunches will adapt themselves satisfactorily to this pack. When the box is filled any spaces between the bunches are carefully padded with woodwool (Plate 45). A layer of woodwool is finally placed on the top of the fruit, and the lid placed in position. The sulphite paper should be cut at least 15 inches by 15 inches in size.

Special points to remember are—

Tease the woodwool into a soft pad.

Keep the bunches tightly packed and well padded so that there is no movement in the fruit after the lid is applied.

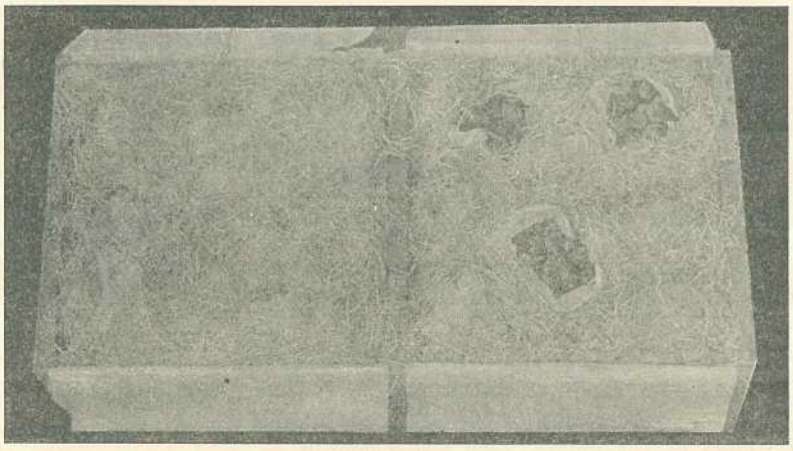

Plate 45.

Fruit packed for export using the sulphite paper and woodwool method of packing. The paper on three of the wrapped bunches is torn, to show the fruit.

Points to Remember.

Close attention to the following general points when packing grapes will assist greatly in obtaining satisfactory results:—

1. Clip—not pull—all blemished, diseased, and small berries from every bunch. Remember the export trade only wants very high-class fruit. Pulling causes waste.
2. Do not pick grapes after heavy dew or rain, but wait until the fruit has dried. Moisture is fatal to the successful carriage of grapes.
3. Avoid cutting up bunches as much as possible; small bunches or sprigs of berries spoil the sale of high-class grapes.
4. Sweat bunches in a cool, dry place.
5. Do not pack fruit while warm, but allow all fruit to cool completely before being packed.
6. Handle fruit by the stalks only. This helps to preserve the bloom on the grapes, and assists them to keep a fresh appearance even after a long period of storage.
7. See that all boards fit closely together when making up cases.

SHED EQUIPMENT.

The equipment necessary in the packing shed is not very costly. One set of small platform scales, long benches for laying out the grapes ready to pack, packing stands to hold the case while being packed, grape trimmers, case-making bench, wiring machine. The benches and stands can be made cheaply at home. Empty galvanised iron crates with the addition of legs make satisfactory benches.

LABELLING.

The use of a distinctive label is of great assistance from the display and advertising point of view, although these may be hard to obtain under wartime conditions. Labels should be bright and attractive. The design should have spaces left for printing all particulars, such as the weight and variety of grapes. To be complete the label should have embodied in the design the grower's name and address, and the words "Queensland, Australia" in plain letters in order to conform to the Commerce Export Regulations. A label 11 inches by 5½ inches will fit the end of the export case or standard half-bushel. The dump half-bushel label will measure a maximum size of 8 inches by 7 inches.

STENCILS.

Stencils, if used, must also conform to the Commonwealth regulations and Queensland Fruit and Vegetables Act by having the full name and address of packer, and where used for export the words "Queensland, Australia." Cases must also be branded with the name of the fruit and the weight contained in the case.

WIRING.

Wiring the cases when exporting or sending long distances is a necessity. The wires should be placed around the case ⅛ inch from the inside edge of the ends. Two wires should be used, one at each end in preference to one around the middle of the box. Care should be taken to see that they are placed around the case parallel with the end. This is essential if the wiring is to give the best results. Often when packing for local markets two small boxes can be wired together to advantage.

TRANSPORT.

It is necessary to follow up good harvesting and packing operations by careful handling while the fruit is in transit to rail or wharf. The fruit should not be left where it can become wet. Carters should not walk on or sit upon packed cases. It is only by close attention to all these details that the perfect product can be delivered at its destination in a condition that will ensure satisfactory values.

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Vegetable Production

Vegetable-growing in North Queensland.

S. E. STEPHENS, Northern Instructor in Fruit Culture.

VEGETABLE-GROWING may be divided into four classifications according to the purposes of production, viz.:—(1) home gardening, or the small-scale growing of a wide range of vegetables on town allotments or similar areas for home consumption; (2) market gardening, which is the commercial growing of a wide range of vegetables on small farms for local markets; (3) vegetable farming or the commercial production of large quantities of one or more vegetables for despatch to distant large markets; (4) cannery farming—*i.e.*, large-scale production of specialized varieties for canning purposes. In past years vegetable production in North Queensland has been practically restricted to home gardening and market gardening, and even these have been practised on a limited scale. The only serious and successful attempt at vegetable farming has been the tomato industry of Bowen and surrounding districts. Cannery farming has not yet engaged northern attention. Up to the present the local markets have been too small to absorb the produce of an expanded industry, and the handicaps connected with transport to distant markets have discouraged all attempts to establish a strong commercial vegetable-growing industry. Exigencies of war have, however, provided the necessary stimulus and recent production has demonstrated that there are very few vegetables which cannot be grown successfully in at least some part of the area.

With the present expansion of production, many growers are embarking on the growing of vegetable crops for the first time. Northern growers must first realise that climatic conditions are such that in very few places can planting practices of sub-tropical or temperate regions be followed with any great degree of success. Partial exceptions to this rule are the highland areas of the Atherton and Evelyn Tablelands and the Charters Towers area. Although lying within the tropics, these areas experience cold winter conditions, which necessitate, or at least permit, some degree of adherence to southern practices.

Generally speaking, the climatic cycle of North Queensland is a dry, hot spring, followed by storms in late spring and early summer, with monsoonal rains in late summer and autumn, and a dry winter. In the coastal area between Bloomfield River and Cardwell, and in the highlands adjacent to this strip of the north, the rainy season is protracted, lasting from January to May, but in other areas it does not extend beyond March. The planting of vegetables during the months of heavy rainfall is not generally practicable, owing to cultivation and weeding difficulties, bacterial and fungous diseases fostered by humid conditions, and the destruction of young plants by beating rain. In the hot, dry, spring months difficulties associated with high soil temperature, low soil moisture, and excessive transpiration make vegetable

culture precarious. It will, therefore, be seen that, under natural conditions, the northern vegetable season is restricted to the end of the wet season period and the drier winter months immediately following, making the utmost use of the accumulated soil moisture. In the inland areas subject to frost the grower must, however, curtail his planting of susceptible crops so that they may be harvested before the normal frost period.

It will readily be observed that a stable vegetable industry cannot be built upon the short, natural season that the climate permits. However, the use of irrigation allows the season to be extended by many months into a period when diseases and pests are less prevalent and when supplies are short. Thus, vegetable-growing can be made a profitable commercial venture.

Selecting the Site.

Before choosing a site for the vegetable farm it is necessary to consider the requirements of vegetable crops. Vegetable plants are highly specialized, and to obtain satisfactory results special conditions must apply. In the first place, most vegetables are short-term crops and, in relation to their period of growth, the amount of vegetative growth is considerable. For example, an ordinary crop of cabbage produces 10 to 12 tons or more of vegetation per acre in the short period of twelve weeks. This indicates that soils must be rich. When it is further understood that the root system of most vegetables is restricted it will be apparent that plant food must be readily available as well as plentiful. A rich and friable soil is, therefore, a basic requirement and for reasons pointed out above it is also necessary that the site be located in proximity to a good water supply and be capable of either spray or flood irrigation. Second-rate soils can, of course, be built up to the high degree of fertility necessary for vegetables, but this is a costly undertaking and is warranted only where other conditions, such as location in regard to market, make a site particularly suitable. Insofar as home gardens are concerned, the intensive nature of the gardening renders the complete rebuilding of the soil both practicable and profitable.

Loamy soils are most suitable for early crops since their open texture allows rapid drainage of excess water, thus permitting soil preparation and planting of crops immediately after the heavy rains. Later in the year, during the spring and summer seasons, these soils become very dry and hot, however, and are not then so suitable. Soils of heavier type, on the other hand, require a longer period after the rains before they are fit to cultivate and plant, but they retain moisture longer and keep cooler during the dry, hot months. Such soils are, therefore, best suited for main and late crops.

The most suitable soils for vegetables will be found mainly on alluvial flats adjacent to creeks and rivers or in delta lands such as the Burdekin and Don River areas. Such soils are naturally of a high degree of fertility and water is available for irrigation.

Management of the Soil.

Liming.—Within the heavy rainfall area of the north it is found that most of the suitable soils are normally highly acid, due to the heavy leaching of lime by rain. For most vegetable crops this condition is

unsatisfactory and must be corrected by the application of lime in sufficient quantity to bring the soil to a state approaching neutrality. Some of these soils will be found to require an initial dressing of as much as 3 tons per acre of pulverized limestone or processed lime to bring them to the optimum condition. Subsequent applications of about 1 ton per acre every second year will be required to maintain the correct condition.

Acidity is not a general condition of all soils in North Queensland, however. The light rainfall areas are usually exceptions—such as, for instance, the Don delta, the Burdekin delta, Charters Towers and Mareeba districts. In the high rainfall zone there are exceptions also, Mount Quincan and the main maize area on the Atherton Tableland being examples. In such areas lime is not required.

Green Manuring.—One of the most important constituents of a good vegetable soil is its content of freshly decayed organic matter, or humus. This supplies plant food to the crops in a readily available form that can be taken up by the roots of the plants. It is a constituent which is rapidly exhausted from the soil under North Queensland climatic conditions. Quite apart from what may be absorbed by growing crops, the heat of the tropical sun on exposed soil will quickly burn out the humus. Soil investigators working on tropical soils have found that when the soil temperature exceeds about 77 deg. Fahr. the decomposition of humus outpaces its formation. Such a temperature is regularly exceeded in the tropics when the soil lies exposed to the sun. This suggests that as far as possible the soil should be shaded to prevent the burning action and also that the humus content should be replenished as often as possible. To accomplish both these objects, cover crops should be grown and ploughed under whenever land is free of vegetable crops. Normally, it will be found that weed growth springs away rapidly when land is left uncultivated for a few weeks, thus providing a natural cover crop. Such a crop is useful, but its value may be offset to some extent if it reaches maturity and ripens seed before being ploughed under, thereby fouling the land with weed seed.

Undoubtedly, the most desirable cover crops are legumes, since most plants of this family have the characteristic of being able to take up nitrogen from the air and hold it in nodules which are developed on the roots. A good leguminous cover crop is capable of enriching the soil by upwards of 100 lb. of nitrogen per acre, and since nitrogen is one of the most important of the plant foods the value of such a crop is at once apparent. In nitrogen value, the figure quoted is equivalent to 500 lb. of sulphate of ammonia per acre.

Some thought should be given to the selection of a cover crop plant suitable for the conditions under which it is to be grown. Generally speaking, crops of the cowpea type are most suitable for quick coverage and short-term growth. The most rapidly growing variety is the black cowpea, followed by Poona pea and Groit pea. Crops of longer duration are the giant cowpea and Mauritius bean, but these have the disadvantage of being rather slow in covering the soil, thus giving weeds an opportunity to become established. Weed growth can be checked, however, by planting the cover crop in drills and cultivating during the early stages of growth—or, alternatively, by using a mixture of the quick-growing varieties with the slower, long-term varieties. Under tropical conditions, black cowpea is fit to plough under in about eight weeks, Poona and Groit

peas in about ten weeks, and giant cowpea in twelve to sixteen weeks. Mauritius bean takes about twenty weeks to produce its maximum growth. The quick-growing varieties are more succulent than the long-term ones but are susceptible to damping-off when grown during the humid wet season weather. This is particularly the case in the high rainfall area. An alternative crop that has found considerable favour in recent years in tropical areas is one or other of the crotalarias. These are upright-growing, shrubby plants of a woody nature, which may be ploughed under in from three to five months after planting. Three varieties have given satisfactory results in North Queensland, viz.:—*C. anagyroides* (the giant crotalaria), *C. goreensis* (the Gambia pea), and *C. usaramoensis*. The crotalarias have one disadvantage—they have small, hard seeds that will only give good germination when planted on a well-prepared seed bed and supplied with ample moisture. As the normal planting season is the storm period there is always a certain amount of risk either that a heavy storm will spoil the seed bed or that the weather will remain dry so long that the seed bed will dry out and so prevent germination.

The cover crop fits into the crop rotation during the wet season months. At this period of the year it will not displace cash vegetable crops since very few vegetables can be grown during these months. The objective, then, for this period should be to have the land sown down during the storm season to one of the legumes listed above. It will not only enrich the soil but will also smother weed growth and prevent soil erosion during the heavy rains, after which it is turned under as green manure. On lands subject to flooding it is most essential to grow a cover crop in the wet season to conserve the soil.

Farmyard Manuring.—Soil-building practices additional to cover cropping or green manuring can also be profitably undertaken. Chief of these is farmyard manuring. Unfortunately, in these days of mechanical power many farmers have no supplies of dung available, but anyone having access to a supply is strongly recommended to make full use of it. In some parts of America dressings of 50 tons or more per acre are applied regularly to vegetable soils of a light, sandy nature. Whilst such large amounts are not available here to the majority of vegetable-growers, quantities up to 8 or 10 tons can frequently be obtained and dressings at even this rate per acre are extremely valuable. Where a green manure crop is grown for ploughing under at the end of the wet season the manure dressing may be applied in the early spring before a green vegetable crop.

Throughout the northern coastal area there are certain portions of land so located on the banks of creeks or rivers that each year they are covered by flood waters. Where the location is such that the flooding is only in the nature of a backwater, heavy deposits of silt are dropped on the land. The silt usually forms a rich addition to the soil. Unfortunately, quantities of weed seed are also frequently deposited. Land so situated, therefore, often requires more cultivation to control weed growth than lands not subject to flooding.

Preparing the Seed Bed.—The proper preparation of the land is one of the most important factors in successful vegetable-growing, and it is the operation that is most frequently unsatisfactorily performed. Too often land is roughly turned over in large clods with a disc plough

and superficially raked over with light harrows, which only break down the surface to more or less level condition and leave the clods underneath. Then, to make matters worse, seed is planted before the green cover that was turned under has rotted down. Such methods foredoom a crop to failure.

The correct tillage of the soil is dependent upon the use of suitable implements in an efficient manner and at the right time. The type of soil largely decides the implements to be used, but in most tropical soils the following will be found necessary:—(*a*) a good plough, preferably of mould-board type, that will turn the soil to a depth of 9 to 12 inches; (*b*) disc cultivators; and (*c*) harrows. If the soil is of a type that tends to break up in a lumpy condition or remains in a very open state after working, then a cultipacker will also be necessary.

The general farming practice in most northern areas has been to use a disc plough. However, such an implement, which has a cutting action, is not considered so satisfactory as a mould-board plough, with its shearing and crumbling action, in preparing soil. A disc plough can only be considered a satisfactory implement for out-of-season ploughing. In vegetable-farming there is no excuse for ploughing when soils are not in ploughable condition, hence there is no reason for using the less desirable type of plough. Many mould-board ploughs available to farmers in the past have certainly not been of the high class material and construction necessary to give good results. Unscientifically designed mould-boards, with a rough finished surface, have been found not only to fail to turn the soil but to clog themselves within a few yards, to the utter discouragement of the user. However, this is only a condemnation of the individual plough, not of the principle involved in the operation of the mould-board plough. In failing to achieve satisfactory results with a mould-board plough the farmer should not at once blame the plough, because the fault may lie in his own lack of skill in deciding whether the soil is in ploughable condition. If the furrow turns over with a greasy surface to its cut edge it is an indication that the soil is too wet. If, on the other hand, the soil turns out in hard clods and fine, dusty particles it indicates insufficient moisture. There is a simple test as to the fitness of soil for ploughing. It consists in taking a handful of the earth and pressing it together tightly to form a lump. The soil is in fit condition if the lump readily crumbles under light pressure of the fingers. If it will not form a lump the soil is too dry and, on the other hand, if the lump will not crumble readily but tends to stick together then the soil is too wet. When ploughed at the correct stage of moisture content the furrow will turn readily without clogging the plough and the soil will crumble freely. The land should be ploughed as deeply as possible without bringing the subsoil to the surface. On good vegetable soils there should be ample depth of top soil, but even where the subsoil is within 6 or 7 inches of the surface the depth of fertile soil can be gradually increased by ploughing slightly deeper each year, thus mixing small amounts of subsoil with the productive top soil but in such small quantities as to be not injurious to the crops. In this way the subsoil can be gradually mellowed and the depth of fertile feeding soil increased. The use of soils as shallow as 6 to 7 inches is not recommended, however.

If the land carries a heavy cover crop great assistance in turning this under can be obtained by first using the disc cultivator to chop it up.

Cultivators of the cut-away disc type are most satisfactory for this purpose as the indentations in the discs catch and hold the green crop for chopping up as the discs revolve.

Disc cultivators should be run over the land immediately after ploughing and again within a week or two to destroy any young weed growth. After allowing sufficient time for the green crop to rot down—a matter of only two or three weeks in warm weather with plenty of soil moisture—the land should be cross-ploughed, disc-cultivated and cross-cultivated, and finally harrowed down for planting. Harrows may be of disc or peg type. One of the disc type now gaining some prominence consists essentially of sets of small discs set close together and combined with a levelling board.

Cultivators and harrows should be used sufficiently on the land to reduce it to fine seed bed tilth. The final harrowing should be closely followed by the planting. If for any reason planting is delayed then the soil should be again harrowed immediately before the planting.

Whether planting is to be undertaken on the flat or on ridges is largely dependent on the type of irrigation to be practised. If spray irrigation is available then flat planting should be the general rule. Under tropical temperatures flat planting is desirable because drying out of the soil is slower than in ridge planting—also, inter-row cultivation is simplified. Ridge planting is advisable, however, during the tropical wet season on account of the quicker draining of excess moisture. Ridge planting is also desirable if the soil is shallow, since the throwing up of beds gives greater depth of fertile soil. The same type of planting is necessary when flood or furrow irrigation is practised. If ridge planting is to be undertaken the ridges may be either narrow, single-row ridges, or wider beds capable of holding two, three, or more rows closely spaced. Single-row ridges are more suitable for transplanted crops or for hand-sown seeds than for machine sowing.

Spacing of rows is a matter about which there is considerable diversion of opinion. There is no hard and fast rule for row spacing. Whilst it must be varied somewhat for various crops, each farmer must be guided by his own conditions. The rule should be to plant at distances to suit the farmer's cultivation implements. This is desirable because it is essential to do as much of the cultural work as possible with machinery and eliminate unnecessary hand work. In this connection, special vegetable-growing machinery is now becoming available as attachments for both small garden tractors and larger field tractors. This embraces adjustable multiple row planters, fertilizer droppers, and inter-row cultivating implements. This standardised machinery does much to simplify all the operations in row crops. In using this machinery, however, care must be taken to treat each set of rows planted as a group and to carry out all the operations on the one group. Each row is accurately spaced from each other row in the one group, but slight irregularities always occur in the distances between the outer rows of adjoining groups. If subsequent cultivation or other work overlaps rows in two groups there is danger of destruction of the plants or other unsatisfactory performance of the operations. Whatever the type of implement used for planting, the rows should be made as straight as possible.

[TO BE CONTINUED.]

PLANT PROTECTION

Five Minor Fungous and Virus Diseases of Citrus.

F. W. BLACKFORD, Assistant Research Officer.

THE four major fungous diseases of citrus were discussed in the December, 1943, issue of this Journal, and citrus fruit rots and blemishes were dealt with in last month's issue. Five other citrus diseases, namely, collar rot, Armillaria root rot, Ganoderma root rot, psorosis, and pink disease are now discussed; they are all of less importance than the diseases dealt with in December, but they are nevertheless capable of appreciably adversely affecting the productivity of the orchard if their control is neglected. All but psorosis, which is caused by a virus infection, are fungous diseases.

ROOT AND COLLAR ROTS.

There is a definite set of symptoms which indicates disorders of the root or collar in citrus trees. An affected tree shows signs of unthriftiness which may sometimes be confined, particularly in the early stages of the trouble, to a single limb. The leaves of an affected tree develop a paler-green colour than is normal in citrus foliage, and finally turn yellow; there is also a considerable amount of dieback, so that the tree becomes very stag-headed. The young shoots which appear on it are small, and instead of developing a healthy, dark-green colour they are yellow and eventually die back. Another symptom is heavy leaf-fall, and a tree very soon presents a thin, ragged appearance. Blossoming may be very heavy, and an unusually large number of undersized fruit is frequently set. Such are the symptoms common to all root and collar rots in citrus; in many cases, however, but more particularly in the early stages of the development of the trouble, these symptoms may be confined to one or to only a few branches.

If the trunk of an affected tree is examined at about ground level it may be found that there are darkened areas of bark from which gum is exuding, and that the bark has lifted and cracked and is fairly easily peeled off. If these symptoms are present, the disease is known as collar rot, a trouble which is very prevalent in lemons grown in coastal districts. It is caused by several species of fungi which may gain entrance to the tree through wounds such as occur when chipping or as a result of sprays, especially those containing oil, running down the trunk and collecting at the base of the tree. Shallow soils, particularly those overlying clay and subject to water logging, are very conducive to the incidence of the disease.

If the collar seems healthy, examination must proceed further to include the root system. Such an examination occasionally discloses the presence of black, string-like structures (Plate 46) pressed close to the bark of some of the roots. These structures, suggestive of shoe-laces, are a stage in the development of a fungus, known as Armillaria, which attacks the roots. The bark on attacked roots is inclined to shred, and such roots, if broken across, are found to give off a mushroom-like odour. In advanced cases of attack, a cottony, or somewhat thin, felt-like fungus may develop under the bark. In wet weather, clusters of honey-coloured toadstools packed tightly together may appear at the base of an attacked tree; these are the spore-bearing bodies of the fungus.

Recently another type of fungus, Ganoderma, has been found attacking citrus roots and killing trees. A noteworthy feature of Ganoderma attack is the fact that the layer of soil which is in immediate contact with the bark of the roots adheres very tightly to it, and indeed appears to form a sheath round the roots (Plate 46). The bark itself is thoroughly permeated by the fungus and readily falls from the woody core of the root. No shoe-lace structures are present, but if the adhering soil is carefully removed with the outer layer of the bark, a creamy, woolly growth of fungus is found on the inner layers. A mushroom-like odour emanates from the dead and decaying roots.

Both these fungi, Armillaria and Ganoderma, have been found living in rotting tree stumps and roots left in the ground when the land was cleared. In Queensland, Ganoderma has been found on old

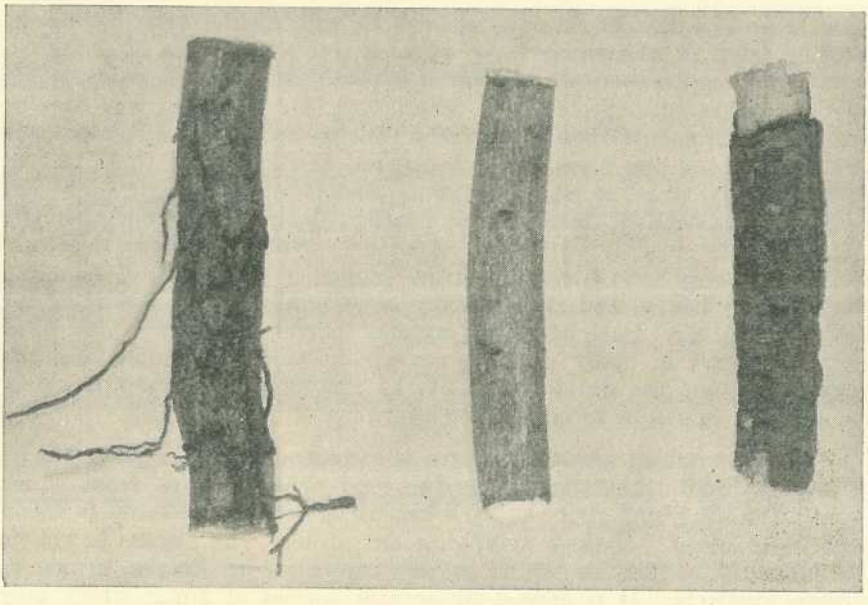


Plate 46.
CITRUS ROOT ROTS.
Left: Armillaria "shoe-laces" growing on a lemon root.
Centre: Healthy lemon root.
Right: Lemon root rotted by Ganoderma. Note the soil-encrusted bark broken away from the woody core.

bloodwood and ironbark stumps. From such rotting stumps the fungi are able to reach out and attack citrus roots on trees growing nearby.

Control.

Prevention of infection is all important in these three diseases. To guard against Armillaria and Ganoderma, it is essential that the land be well cleared in the first instance, and, if possible, sown to a green manure or other annual crop for twelve months or so before planting the trees; such a pre-planting interval gives the native tree roots a chance to decay.

Should any one of these diseases appear in the citrus orchard, the soil should be dug away for a distance of about 2 feet from the butt of affected trees, thus exposing the main roots to the influence of the sun and the air, which, in mildly-affected cases, kills out the exposed fungus. Badly-affected and dead roots should be cut away and the surface tissue scraped well back into healthy tissue to ensure that all bark and wood infected by the fungus, but not as yet showing visible symptoms, are removed. These scraped surfaces should then be painted with Bordeaux paint to prevent reinfection. The butts and main roots may be left exposed for several months, but should be covered again with soil before frosts are likely to occur. In the case of Armillaria and Ganoderma every effort should be made to locate and remove the stump which is the source of the fungus.

A soil treatment with carbon bisulphide, after the removal of an affected tree with as many of its roots as is possible, is now being recommended in California for the control of Armillaria. This control measure is rather expensive, but growers may care to give it a trial if only a few trees are involved. Holes about 2 inches in diameter and 18 inches apart in a diamond pattern are made in the soil in which the trees were growing; these holes are made to a depth of 6 to 8 inches by means of a crowbar, the work being done when the soil is dry. Two fluid ounces of carbon bisulphide are poured into each hole, which is then sealed with soil and tamped down. The surface of the soil to a depth of 2 inches may then be moistened with water and the area covered with bags to retain the fumes. In the immediate vicinity of the position previously occupied by the butt and large roots of the tree, however, the dosage rate must be doubled and the holes deepened. An area treated in this manner may be replanted six to eight weeks after treatment. Growers may also care to test this Californian control recommendation in the case of Ganoderma.

PSOROSIS.

Citrus psorosis has now been shown to be due to an infection by a virus. On young leaves of an affected tree a mosaic-like mottling is produced by many elongated, light-coloured streaks. These may disappear as the leaf ages, and, at any time, are difficult to recognise, as it is easy to confuse them with the mottling produced by other adverse factors. The symptoms of the disease most familiar to orchardists are those appearing on the trunk and main limbs of an affected tree. Small, raised, pimply areas are formed on the bark which lifts and cracks to form small scales (Plate 47). Eventually the deeper layers of the bark and wood are affected and discoloured, and, at times, there is a small exudation of gum. At first the scaling of the bark is restricted to small, localised areas, but it may spread very slowly to involve large areas

on the trunk and main limbs. Psorosis infection produces weak twig growth and some dieback and hence an affected tree becomes somewhat stunted.

Plate 47.
PSOROSIS.
An advanced stage showing extensive bark scaling.

Plate 48.
PINK DISEASE.
A branch showing cobweb-like growth of fungus.

Control.

Because of its virus nature this disease may be transferred from affected to healthy trees by means of buds used for propagation purposes in the nursery. It is therefore essential to select budwood from trees which are free from any typical leaf mottling or scaling bark.

If a tree shows signs of having become infected and the bark is beginning to scale, its life may be lengthened by scraping the diseased bark to just below the green layer and painting the scraped area with Bordeaux paint or lime sulphur, the latter being used at a strength of 1 part of concentrated lime sulphur solution to 6 parts of water. The area which is scraped should extend 6 inches or so beyond any scaly lesions so as to include tissue which has been invaded by the virus but has not developed symptoms. A tree so treated will then develop fresh bark to cover the scraped surface, but a watch should be kept for any reappearance of symptoms. Should that occur further treatment is called for.

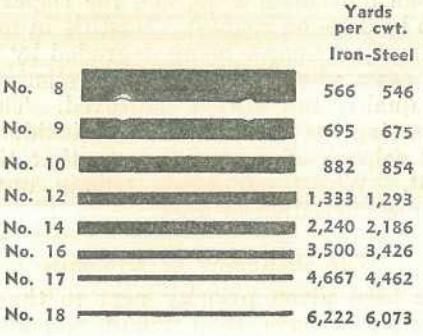
PINK DISEASE.

While pink disease may be found in South Queensland it is most prevalent in the wetter districts in the northern parts of the State. The first observable symptom of this disease is the wilting and final death of a small branch. On close examination it is found that, especially in wet weather, a cobweb-like, white, or salmon-pink coloured, fungus (Plate 48) has grown over the bark of the branch, often completely girdling it, and causing the bark to lift and crack. This fungus may spread along such an affected branch, finally infecting the main framework and killing large portions of the tree.

Control.

Once it is known that pink disease is present, infected branches should be pruned out. The pruning cut must be made a little below any observed fungus or cracked bark as a portion of the wood may be infected by the advancing fungus without any symptoms being visible. All pruning cuts should be painted with Bordeaux paint or tar to prevent reinfection, and all prunings burned to destroy the fungus and any spores which may be present. Trees so treated should be examined periodically to make certain that the diseased wood has been completely removed.

WIRE GAUGES.



Milk Quality.

O. ST. J. KENT.

WE are living in abnormal times, when conditions on dairy farms are made more difficult through lack of materials, shortage of manpower and the like. In spite of this, the milk suppliers to Brisbane have done a good job in providing milk of satisfactory quality over the war years; but there is evidence that the strain is beginning to tell, and it is becoming increasingly difficult for them to maintain the quality that is so desirable for a city trade.

The development of the milk industry will go hand in hand with quality. The better the quality of the milk and the greater faith the consuming public has in its milk supply, the sooner will the industry speed ahead and the per capita consumption increase. Quality must be maintained and improved at all costs. The following notes are therefore given to aid farmers in their efforts to produce milk of the best possible quality.

Health of Cow.

The health of the cow is of first importance. A cow which suffers from disease gives abnormal milk, and every effort should be made to find out which cows are normal and which are not, and to keep the milk from abnormal ones out of the bulk. Milk from cows suffering from mastitis is unsatisfactory and should not be forwarded with the normal supply. It is not always possible for farmers to determine which cows are affected with mastitis, but this may be found by laboratory examination of samples from individual cows, and the Department is willing to arrange for this to be done on request. Mastitis in milk has been found to be the cause of many a sample being degraded by the methylene blue tests, and in those cases where the farmer has eliminated the milk from mastitis cows the quality has always improved. The diseases such as tuberculosis and contagious abortion are the insidious ones which call for some national scheme of eradication, so that the farmer and the nation will benefit. Whilst our herds remain untested there is no argument against pasteurisation of milk.

The Cleansing of Utensils.

This item has been given priority next to the health of the cow because unclean utensils have been found responsible for the poor

keeping quality of many samples of milk examined. This is not only the experience of Queensland, but it is the experience of all other dairying countries. There are many reasons why trouble is found with utensils, and some of these are listed below.

(*a*) Inadequate supply of water at the bails and dairy.

(*b*) Lack of proper facilities for washing, scalding, and/or sterilising equipment.

(*c*) Use of incorrect methods.

(*d*) Inexperienced labour.

(*e*) Carelessness.

(*f*) Dusty surroundings.

(*a*) *Inadequate Water Supply.*—Utensils cannot be cleaned without water, and yet on some farms a supply of water at the bails or dairy house has been one of the last things considered. It is appreciated that in some districts the water problem is much more difficult than in others, but when one embarks on the production of a foodstuff so delicate as milk, it is necessary that provision should be made for its production under the best possible conditions. Water is essential not only for the cleansing of utensils, but for the cleansing of floors, washing of udders, cooling of milk, and for the washing of hands of milkers.

(*b*) *Lack of Facilities for Cleansing Utensils.*—Very often the uncleanliness of utensils is the result of an insufficient supply of boiling water. Cases are still reported of farmers carrying a kettle or kerosene tin of water from the house to the dairy house to do a job that requires 12 or more gallons of boiling water. It is necessary that the boiling water should be right on the spot, and in sufficient quantity to cleanse and sterilise the utensils on hand. A boiler holding 12 gallons is the minimum for any farm, and where machines are used, or a large number of cows are being hand milked, a steam steriliser is a good investment. Accessories, such as brushes and cleansing soda compounds, are not so easy to procure now, but they are necessary to do good work.

(*c*) *Use of Incorrect Methods in Cleansing.*—Cleansing of utensils involves three simple steps—

(i.) Rinse with cold or luke-warm water very soon after milking is finished.

(ii.) Cleanse with aid of brushes and hot water to which washing-soda or other suitable cleansing compound has been added.

(iii.) Scald with boiling water and allow to dry. If a steam steriliser is available a steaming for five minutes at this stage will make a more thorough job of it.

Even on farms where ample boiling water is available it is not always used to the best advantage. For example, cans and buckets are often taken through the first two steps, but are not given a final treatment with boiling water. At other times, the boiling water that is available for scalding is all put into one can, and from this it goes to the next can, and so on. The first can is well sterilised, but the heat treatment of the others diminishes as the water passes on. It is better to give each piece of equipment a rinse with a smaller amount of water that is definitely at boiling point.

(*d*) *Inexperienced Labour.*—Nowadays difficulties in securing good men for dairy farms are great. The necessity for strict cleanliness in all matters relating to milk, and particularly in regard to cleaning of utensils, should be impressed on all new hands right from the start. In view of the importance of clean utensils in relation to quality, it is better for the farmer himself to do the cleansing jobs until he is satisfied that his assistant has had sufficient training to do the work for him. Washing up is too often made the Cinderella job on the farm, whereas it is one of the items that need expert attention if best results are to be achieved.

(*e*) *Carelessness.*—Most farmers take a pride in their work and do what they consider to be the right thing about the cleansing of utensils. Sometimes a farmer may overlook some factor which will cause him trouble, but the careful and conscientious man will invariably experience little trouble over a long period. It is the careless man who usually strikes the most trouble, the individual who skimps over his work, and hopes for the best. They are to be found in all districts, and usually blame everything and everybody but themselves. Dairying is a business which calls for everything to be done to schedule and in a proper manner.

(*f*) *Dusty Surroundings.*—A lot of good work may be undone if clean utensils are stored so that they become contaminated with dust. It is essential before using utensils that they should be rinsed just before milking. This is best done with a sterilising compound of the chlorine (hypochlorite) type or with water that has been previously boiled and allowed to cool. This rinsing before milking is very important, and should apply to buckets, cans, cooler, strainer, vats, milking machines, and any other piece of equipment with which milk comes in contact. It is equally important that every effort should be made to keep down the dust nuisance. The daily removal of fresh manure, before it is trampled to dust, will keep the yards clean and help in this direction.

Cooling of Milk.

Milk will keep longer if it is cooled, but in Queensland in summer time it is not always possible to achieve any great degree of cooling unless a refrigerator is available. The best one can hope for is a temperature within a degree or two of the cooling water. Cooling should be carried out on all farms, and if sufficient water is available the tubular or wash-board type of cooler should be used. The bee-hive type of cooler is at the best only an aerating device, and unless it is kept thoroughly clean and in sound condition may do more harm than good. Refrigeration is the only sound method of cooling in a sub-tropical country, and the time is visualised in the not-too-distant future when electricity will be available to all dairy farms, and refrigerators a common commodity. It will then be unnecessary for dairymen to milk cows at midnight to please a fastidious public. Cows will be milked at reasonable hours, morning and afternoon, and the milk chilled and delivered once a day.

The cooling of milk, particularly by refrigeration, should not be used to mask unsatisfactory cleansing methods. Cleanliness and proper methods of cleansing are the most important factors in quality milk production, with cooling as an added safeguard against quick deterioration.

Transport of Milk.

Milk is a perishable product with a relatively short life. Its journey from the farm to the factory or the consumer should therefore be a

quick one, and every care should be taken to preserve the quality of the milk on that journey. Trucks should be well covered, as exposure of cans to the hot blazing sun will soon lower the quality of milk. Milk that requires to be transported long distances to market must necessarily be properly cooled, and in Brisbane the time appears to be fast approaching when milk will have to be cooled at suitable receiving depots before being despatched to the city from country centres.

Experiments are being conducted at present in the Dairy Research Laboratory to find out how milk quality is affected by transport under existing conditions.

Other Factors.

In addition to the factors discussed above there are many others which the dairyman has to watch to produce milk of satisfactory quality. The cleansing of udders, removal of fore milk, maintenance of bails and yards in a clean condition, removal of feed remnants from dairy, straining of milk and similar items, all have their place in the daily routine, and their importance has been stressed on many occasions.

Laboratory Tests.

The milk supplied to the Brisbane market under the Milk Supply Act is controlled by laboratory tests. The methylene blue test and the Babcock test are used for checking up on quality, and in the case of unsatisfactory supplies a detailed microscopical examination is made, and farmers are notified of the findings. The laboratory control has played a big part in maintaining the quality of milk, and has rendered the farmers a service in helping them to improve conditions on the farm and in eliminating unsatisfactory animals. Reports sent out from the laboratory should be taken as advice notes, primarily sent to the farmer to indicate to him that something is amiss. The prudent dairyman acts on the advice given, and very often calls at the laboratory to discuss his problems with the technical officers.

In Queensland, at present, payment for milk at most depots is made without regard to the butter-fat content or the bacteriological quality. The time must soon come when all milk is paid for on a basis of quality, both chemical and bacteriological, and then a rapid advance in the quality of milk will become evident.

Cottage Cheese.

O. ST. J. KENT.

THIS is a soft cheese made from skim or separated milk. On farms and in households there is usually a surplus quantity of skim milk which is too often thrown to waste. The making of cottage cheese offers an economical way of using skim milk, and will also help the housewife to solve the problem of meat rationing, since cheese is a food which is rich in protein.

In making cottage cheese the utensils required are few. An enamel or tinned-steel bucket or other suitable vessel may be used for setting the skim-milk. Other requirements are a square piece of cheese cloth, fairly coarse textured, a long-bladed knife, a spoon, and a thermometer.

A gallon of skim-milk will give about 1½ pounds of cottage cheese.

How to Make the Cheese.

Place one gallon of freshly-skimmed milk into the vessel, and bring to a temperature between 70 degrees and 80 degrees Fahr. Add a cup of sour milk and allow to set in a clean, warm place until the milk has coagulated (see notes below). When the curd is fairly firm, it is cut with the knife into cubes with the sides from 1 to 2 inches long. The whey will now start to separate from the curds, and after stirring gently with a spoon for five minutes, the temperature should be raised to 100 degrees Fahr. and maintained at that mark for half an hour. (Heating is probably best carried out by placing the vsssel containing the curds and whey into a vat or small tub containing hot water, the temperature of which is suitably adjusted.) The curds and whey are then poured onto the cheese cloth, which is tied to form a bag by taking up the four corners and fastening with string. The bag is then hung up to drain. The whey soon drains out and when it stops draining freely the curd is emptied into a dish, worked into a smooth paste, and salt is added to suit one's taste. An ounce of salt is approximately the amount required when 1 gallon of milk is used.

If cream is available, the flavour and texture of the cheese will be improved by adding a tablespoonful of fresh cream at the time of salting.

The cheese may be eaten immediately it is made, and is preferably eaten fresh. It should not be kept more than a day or two, and should be stored in a cool place until used.

Explanatory Notes.

The coagulation of the milk is brought about by the action of lactic-acid bacteria, which develop naturally in milk and produce lactic acid. The milk will coagulate itself if allowed to stand long enough, but may at times take as long as twenty-four or thirty hours. It is therefore preferable to add a cupful of sour milk to the gallon of skim milk, as this shortens the setting period to twelve or eighteen hours. The milk if set at night time will be ready for cutting next morning. This sour milk should have a clean, sharp lactic-acid flavour, otherwise the flavour of the cheese will be impaired. Such sour milk is known as a starter.

Starters specially prepared from lactic cultures are used by all cheese factories from which they could no doubt be procured if desired. They will also be posted to any address for the nominal fee of 1s. 6d. upon application to the Dairy Research Laboratory, Brisbane. Freshly-skimmed milk is the best to use, otherwise undesirable flavours may be found in the cheese.

Cleanliness should be observed as in the preparation of other dairy products if best results are to be achieved.

CHANGES OF ADDRESS.

Subscribers are asked to kindly notify changes of address to the Department of Agriculture and Stock, Brisbane, without delay.

Grain-feeding of Pigs.

E. J. SHELTON.

BACON is wanted urgently and in large quantities. The logical method of increasing production is to either use more grain—especially wheat, which is being made available at a cost that should be payable to pig-raisers—or pollard. There should be enough margin between the price of bacon and the cost of feed to allow the dairy-farmer pig-raiser to carry, at least, as many pigs as he can handle, and even to expand to the level where the pigs are receiving 1 gallon of milk a head and all the grain and pasture they will eat.

Grain-feeders who have no milk should use meat meal. All who feed grain in large quantities can, with advantage, limit the maximum amount to 4 lb. a day when the pigs reach that level of consumption, or even up to 6 lb. for sows that have weaned large litters and need building up again.

In fact, if more bacon is to be produced, more grain feeding will be essential. This is true for the dairying districts, where pigs have hitherto been fed largely on skim milk, and for other pig-raising areas. The use of grain along with skim milk increases the number of pigs that can be produced. If the maximum quantity of grain required to balance the milk be used the bacon-producing capacity of the available milk supplies could be increased almost sevenfold.

The profitable feeding of grain calls for—

(1) Continuous and adequate supplies of grain;

(2) Grain at a reasonable and stable price.

Bagged wheat is now available in 10 ton truck lots at 3s. 6¾d. per bushel at purchaser's siding if purchased through the State Wheat Board, Toowoomba. Smaller quantities would cost 3s. 9d. to 4s. per bushel. If required, the Board would supply full particulars and advise regarding payment and freight.

The "best" grain is that which shows the greatest profit. Wheat and barley can be used throughout the life of a pig. Maize is a good grain for the early stages but at present values does not compare favourably with wheat. Oats carry too much husk to be fed as the only grain; they should not form more than one-quarter of the total weight of grain fed. The best buying among the grains can be worked out by dividing the price of each *per bushel* by the following figures:—Wheat and maize, divide by 43; barley, 36; oats, 24; the cheapest is that which gives the lowest "answer." At present prices, wheat is the

best buying. Since wheat and maize have the same value *per bushel* for feeding purposes, those who grow their own maize may find it more profitable, when maize is dear, to sell their maize and buy wheat.

Cereal grains are better ground to a coarse meal than fed whole. The saving in feeding value is usually sufficient to pay for the cost of grinding. Barley and oats are improved so much that it definitely pays to grind them before feeding, the nutritive value being increased by about one-eighth; in other words, when wheat costs 3s. 6d. the improvement by grinding is about equal to the usual charge for grinding—6d. per bushel. Those who can do the grinding themselves at lower cost and have the labour to handle it will find it worth-while to grind the grain they use.

When wheat is fed to pigs through a self-feeder, the improvement by grinding is only one-sixteenth—an improvement of 2½d. when wheat costs 3s. 6d. Pigs fed whole wheat appear to waste a lot, as judged by the amount of whole grain that passes through them undigested.

Soaking is not nearly as good as grinding; in fact, recent work indicates that soaking slightly lowers the feeding value of the whole grain meal and there is no advantage in soaking.

In general, there is no payable advantage in cooking any of the cereal grains—grain sorghum meal included—for pig feeding.

Feeds to go with Grain.

Grain alone does not give the most profitable return. It should be fed along with skim milk or, if no milk is available, with meat meal, pasture, or lucerne chaff or hay and a mineral mixture.

On the dairy farm where skim milk is available, the amount of grain used will depend on the amount of milk and green food available per pig. The man with abundant milk and few pigs will not feed as much grain as the man with only a limited quantity of milk per pig. Where grain is being largely used, 1 gallon of skim milk per pig daily throughout the fattening period will give satisfactory results.

On pig-farms where no milk is available, the place of milk can be taken by meat meal and the mineral mixture. A suitable mineral mixture is four parts of ground limestone (carbonate of lime) to one part of salt.

Grain feed is a very necessary supplement to all pig rations.

Supplies of meat meal are limited, and inquiry should be made and orders placed in ample time before the food is required.

The Working Margin in Grain Feeding.

(*a*) *On the Dairy Farm.*—The position on the dairy farm raising pigs is not simple. The skim milk supply is not constant. Man-power and accommodation are more likely to decide how many pigs can be kept rather than the maximum number that could be produced from the milk, plus a full supplement of grain. The new fixed prices for bacon and grain should allow a dairy-farmer to feed up to the maximum—that is 1 gallon of milk per pig, plus grain—if he has sufficient labour and accommodation. If he has not enough labour or accommodation and the pigs obtain more than 1 gallon a day, he does not need to feed so much grain to satisfy the pig's appetite.

Under this system he still has at least as great a working margin over the cost of feed as when using the maximum of grain.

(*b*) *Where no Milk is Available.*—On the farm where no milk is available, the usual guide is the quantity of feed that the pigs can eat. One precaution is necessary, however. The new prices allow pigs to be carried up to 200 lb. dressed weight without penalty. Most pigs, if fed to the limit of their appetites throughout, would be excessively fat at such a finishing weight. The safer way is to feed the pigs all they will clean up until they are eating 4 lb. of their grain mixture a day and not to give them any more than 6 lb. thereafter, plus succulent grazing throughout.

If, therefore, the pig-raiser has sufficient labour and accommodation, the prices of bacon and grain should give him a working margin—and a payable one, at that—provided he raises sufficient pigs and raises his own pigs and does not have to depend on the regular purchase of store pigs. It is equally true that the production and utilisation on the farm of the whole of the food supply is the real secret of success, plus good management.

PREPARATION OF GRAIN FOR FEEDING.

Some grains are better ground than fed whole. Maize does not need to be ground for pigs. The saving in feeding value is usually insufficient to pay for the cost of grinding. Barley and oats are improved so much that it usually pays to grind them before feeding.

Wheat does not show such a marked improvement from grinding, though it is often profitable. The nutritive value is increased by about one-eighth; in other words, when wheat costs 3s. 6d. the improvement by grinding is about equal to the usual charge for grinding—6d. per bushel. Those who can do the grinding themselves at lower cost and have the labour to handle it will find it worth-while to grind the wheat.

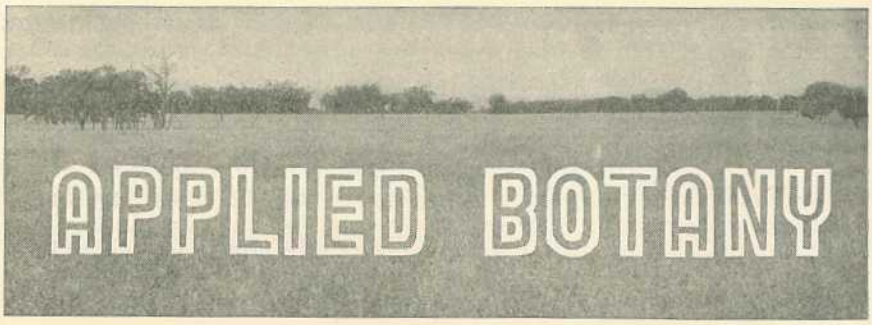
When wheat is fed to pigs through a self-feeder, the improvement by grinding is only one-sixteenth—an improvement of 2½d. when wheat costs 3s. 6d. Pigs fed whole wheat appear to waste a lot, as judged by the amount of whole grain that passes through them undigested. The actual loss is much less than it appears to be.

Soaking is not nearly as good as grinding; in fact, recent work indicates that soaking slightly lowers the feeding value of the whole wheat.

It is an advantage, however, to moisten finely ground grain to prevent it being blown out of troughs or scattered too widely for the pigs to pick it up; but this moistening to make the particles cling to each other can best be done at feeding time.

POLLARD AND BRAN.

Increased supplies of pollard and bran will be available shortly. How do they compare with grain? Bran contains too much fibre to be used in large quantities for pigs; it is better kept for dairy cows. Pollard, however, is not far below ground wheat in feeding value. At equal prices per ton, ground wheat is the better buying.



Edible Trees and Shrubs.

W. D. FRANCIS, Botanist.

4. THE MULGA.*

THE mulga is one of the most important fodder trees in Australia. Conditions which contribute to its importance are its palatability to cattle and sheep and its wide distribution in the inland parts of Australia.

The very large group of plants popularly known as wattles includes the mulga. It has already been pointed out in this series of articles † that the wattles are leguminous trees or shrubs, which are most strongly developed numerically in Australia and Africa.

Plate 49.

MULGA SCRUB ON DYNEVOR DOWNS, BETWEEN THARGOMINDAH AND EULO, SOUTH-WESTERN QUEENSLAND.

—From negative by S. T. Blake.

* *Acacia aneura.*

† This Journal, vol. 57, p. 214, Oct., 1943.

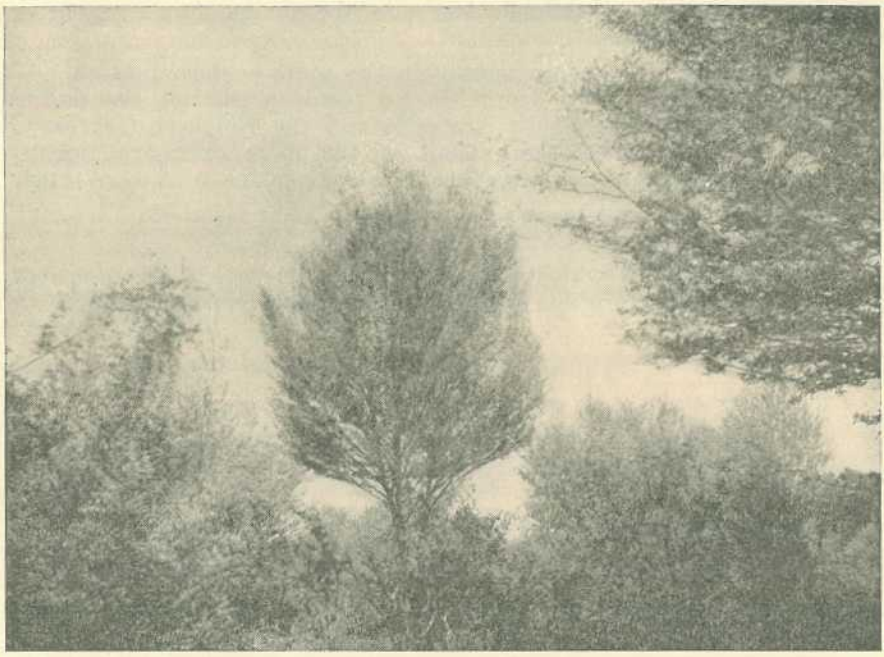


Plate 50.

MULGA SCRUB NEAR CHARLEVILLE, SOUTH-WESTERN QUEENSLAND.

—From negative by S. T. Blake.

Next to the gum trees or eucalypts, the wattles are the chief group of trees in open forests in Australia. The eucalypts are generally dominant in the open forests of coastal areas. The wattles are, as a rule, the commonest trees in the far inland and drier parts. Mostly, the wattles are smaller in stature than the gum trees.

The grey appearance of the leaves and branchlets of the mulga is caused by a covering of fine, white hairs. In most places where the trees are accessible to stock they show signs of trimming. This trimming by stock often gives a striking appearance to the trees. In some places they are eaten back at the top so that all the growth is trimmed to a limit of about 5 feet. Constant feeding off prevents the upward extension of the branches. In other cases, the trees are trimmed from below. In these cases all of the growth is removed from the ground upwards to a uniform height of 6 or 7 feet. The large-scale effects brought about by trimming strikingly demonstrate the palatability of the tree.

The mulga is mostly a small tree. Its height varies according to the rainfall of the area. In some areas where the rainfall exceeds 20 inches per year the trees, when not trimmed by stock, attain over 30 feet in height. In drier areas the height is reduced to 15 or 20 feet. The branches are mostly ascending. The leaves are situated alternately on the branchlets. In shape, the leaves are narrow—2-4 inches long, $\frac{1}{16}$-$\frac{1}{4}$ inch in width. Occasionally, they are seen to be striate. The flowers are borne in yellow spikes in the forks of the leaves, the spikes measuring from $\frac{1}{4}$ to $1\frac{1}{2}$ inch long. The flowers are followed by the pods, which are flattened, and measure from $\frac{1}{2}$ to $1\frac{1}{2}$ inch long and from $\frac{1}{4}$ to $\frac{1}{2}$ inch broad.

In many parts of inland Australia the mulga forms extensive forests or "scrubs."

In Queensland it occurs mainly in the south-western portion. It is found as far east as St. George, in the Maranoa District, and as far west as the borders of South Australia and the Northern Territory. Jundah is about the northern limit of the more extensive forests. Occasional patches are met with farther north, to the west of Winton.

It is also abundant in South Australia and the Northern Territory and extends into Western Australia.

The photographs which illustrate this article are from negatives by Mr. S. T. Blake, to whom appreciative acknowledgment is made.

ANSWERS.

(*Selected from the Government Botanist's outward mail.*)

Paterson's Curse.

Inquirer (Murgon)—

The specimen is Paterson's Curse or Blue Weed (*Echium plantagineum*) which is fairly common in some parts of the Darling Downs, but is more abundant in the southern States than in Queensland. It is especially abundant in South Australia, where it covers acres of wheat land and is popularly known as Salvation Jane.

It has been gazetted a noxious weed throughout Queensland, but seems to spread rather slowly. It is not known to possess any poisonous or harmful properties, but has no particular virtues, except that in some districts it has a good reputation as a honey and pollen plant.

Burr Trefoil or Medic Burr.

J.T. (Mt. Larcom)—

The specimen is the Burr Trefoil or Medic Burr (*Medicago denticulata*), one of the best of the winter legumes grown in Queensland. The plant is best sown about April or May, grows during the winter and spring months and dies out on the approach of hot weather about October or early November. At that time of the year the plant is a mass of little pods which are nutritious and readily eaten by stock.

The plant is more abundant on the Downs country than on the coast, and the only disadvantage it possesses there is that the burrs become matted in the belly wool of sheep.

Tumbling Mustard.

D.C. (Toogoolawah)—

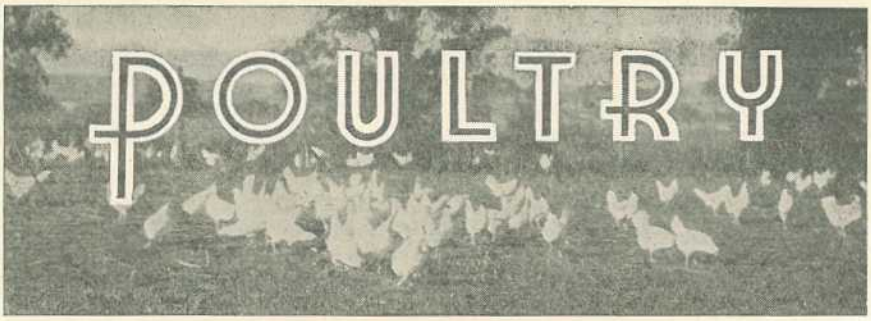
The specimen is the Tumbling Mustard (*Sisymbrium orientale*), a fairly common weed in cultivation in south-eastern Queensland. Like other members of the Mustard or Turnip Family (*Cruciferae*), it taints milk rather badly if cows happen to feed on it.

Bind Weed.

C.K. (Rochedale)—

The specimen is the Bind Weed (*Convolvulus arvensis*), a very serious pest in the southern States and in recent years has made its appearance on the Darling Downs, where it has spread slowly, but surely and more rapidly during the past couple of years.

It is a most serious pest because it produces white underground runners every part of which when broken with a spade, plough or other implement is capable of forming a fresh plant. It has not made its appearance so far as I know on the coast before, and there is hope that the hot summer on the coast may kill it out. In the meantime, every endeavour should be made to keep down the green growing portion of the plant, so that the white underground runners will eventually become exhausted.



Selecting the Breeders.

P. RUMBALL, Poultry Expert.

POULTRY raisers have been asked to increase the output of eggs. If enough material for building were available, this would not be very difficult. Consequently, in present circumstances, the utmost care should be exercised by farmers in the selection of their breeding stock to ensure that, as far as practicable, every chicken hatched will be reared to maturity. Let the health of the breeding flock, therefore, be a principal point in poultry keeping, for without this sound chickens cannot be expected, and from sound chickens come future healthy flocks. Breeders, therefore, should be selected for constitutional vigour.

The Healthy Hen.

Constitutional vigour may be recognised by a study of various characters. The first-class of characters may be termed general habits; and the second, body type and conformation.

The sound hen will be scratching, dusting, feeding, or singing, and taking an intelligent interest in its surroundings, while the hen of poor constitution will probably be upon the perch or standing about and looking sleepy.

A sound rooster is a frequent crower, attentive to the hens, and pugnacious, while displaying the same intelligent interest in his surroundings as the healthy hen.

Among young chickens and growing stock, disease of a contagious nature may cause the birds to look dejected and unthrifty. It is foolish to think that when the trouble abates the condition will be corrected. Some will undoubtedly improve, but culling should, nevertheless, be particularly severe.

Body Characteristics.

Body shape and size indicate largely vigour and physical expression of health. Attitude also indicates health. The poor bird has not the alert stand and movement of the sound fowl. A healthy bird shows indications of good digestion capacity and normal development in a relatively long, broad back, deep body, prominent breast, full abdomen and crop, and moderately long keel. In other words, the bird has length, depth, and width of body. A bird of low vitality is the reverse. A

good illustration of the two extremes between high and low vitality may be observed from the way in which birds of high and low vitality fill in a rectangle. The most pronounced features in comparison are the shallow body, breast, and tucked-up abdomen. Size of shank and bone size are factors also of the poor type of bird easy of comparison. The high vitality bird is compact and blocky, while one of low vitality is loose-jointed, spindly, and of a stilty type.

Poultry are not always uniform in shape. Cockerels may appear stilty, but they will invariably, if they possess vigour, have a rugged appearance. Hens, when laying, are much fuller in the abdomen than during the moulting period, and may have a shrunken appearance. They will, however, have the breast development, and there will be no alteration in length and width of back. Again, the long, thin beak and head, long, thin neck, long, slender body, thighs, shanks, and toes go with the bird of poor vitality, while the reverse is the case with the well-conditioned bird.

The muscular development of a bird also should not be overlooked. It frequently happens that a bird with the framework and feathers of a reasonably good-appearing bird disappoints on handling. Immediately an experienced farmer catches hold of such a bird he becomes aware of a lack of firmness. Examination will indicate a lack of muscular development on breast and thighs, and that the back is poorly fleshed. In such cases the eyes and face may be sunken and lids partly closed. A bird of vigour should have a bright face as compared with either a sunken or fat, sluggish-looking face.

The eye reflects the general health of a bird. Brightness indicates health, and dullness the lack of it. Eyes standing out prominently indicate the healthy condition of the controlling muscles, while the sunken eye with lids partially closed suggests the lack of muscular development.

Size and weight should also be taken into consideration. The biggest and heaviest bird is not necessarily the soundest. Breed and strain have to be considered. Some big-framed birds are not always the heaviest because of lack of muscular development; and, again, their larger appearance may be due to feathers. It is generally good practice to class the smaller and lighter birds in a flock as the weaker constitutionally. They will invariably be found to be excessively fine in bone, and, although fair producers, undesirable breeders. Again, the exceptionally large birds of a flock will usually run to the extreme of coarseness.

There appears to be a definite correlation between the shape of the body and the head. On an excessively long-bodied bird will be found a long, fine neck, a long head and beak, and sunken eyes (crow-headed), while the bird with a solid compact, blocky body has a short, thick neck with a broad, round head and short, heavy curved beak.

Large, bright-coloured soft comb and wattle may be expected with the healthy strong bird. They are a reliable indication of health. The comb condition alters with lay. The comb and the bright red face of the bird are a better indication of health than production.

The large, wide-open, expressive, bright, round eyes, as compared with the sleepy, dull, and sunken eyes, are very important features in judging vitality.

ANIMAL HEALTH

Tetanus in Livestock.

MARSHALL R. IRVING.

DEATHS of livestock caused by tetanus ("lockjaw") occur sporadically throughout Queensland, and mostly of the more valuable animals because of their greater predisposition through more frequent handling and contact with the common sources of infection. As tetanus is now a wholly preventable disease, it is surprising how few stockowners avail themselves, at small cost, of the modern scientific facilities for avoiding all risk of losses in livestock from this fairly common and very fatal disease.

The Commonwealth Serum Laboratories, Melbourne, have had for some years now two important products on the market for use in the *prevention* of tetanus. Their limited use by stockowners is mainly because of the fact that few owners are aware of their existence, or of the very high degree of protection they afford to animals which have been or may be exposed to infection by tetanus germs.

Veterinary Tetanus Antitoxin.

The first of these products is veterinary tetanus antitoxin. This product has been in use for many years, and its chief veterinary value is the protection of animals against a possible occurrence of tetanus following injury or surgical operation. The degree of protection afforded by the antitoxin is high if given within twenty-four hours before or after injury or operation; but *the duration of this protection is limited to two to three weeks only.* In persistent wounds it is possible for an animal to die from tetanus after the protection of the antitoxin has faded.

Tetanus Toxoid.

The second and more valuable product for the prevention of tetanus is tetanus toxoid. This is a more recent development and was first available for veterinary use in Australia just before the outbreak of the present war. This is a vaccine and is *capable of producing in animals an active immunity to tetanus which lasts for life.* It is not suitable for administration for immediate protection of animals after injury or operation, as it takes two weeks to develop its maximum immunity. It should, therefore, be given at least two weeks before a contemplated operation. The immunity produced by the toxoid is very high, and the risk of tetanus in vaccinated animals following immunisation with it is practically eliminated. The advantages of vaccination with this product will surely appeal to owners of all livestock, particularly stud cattle, saddle horses, and stud sheep, in which losses from tetanus occur more frequently. The cost of this protection is negligible, and the trouble involved is the least one could expect for such a satisfactory result.

In view of the very fatal nature of tetanus and the little hope attending attempts at treatment once the disease has become established, the more general use of preventive vaccination with toxiod is strongly urged. It is ironical that an owner may spend many pounds on serum in a forlorn hope of saving a favourite saddle horse or stud bull which has contracted the disease and with very little prospect of success, while the same amount spent on the toxoid would have ensured the protection of his whole herd for many years.

Both products are injected by the ordinary hypodermic syringe under the skin, and the following are the doses and costs:—

1. *Veterinary Tetanus Antitoxin* (to give a two to three weeks' immunity to tetanus following injury or operation).

Doses—Horses—500 units (U.S.A.).
Cattle—500 units (U.S.A.).
Sheep—100 units (U.S.A.).

Available in bottles as follows:—	Price. s. d.
1 bottle containing 500 units (U.S.A.)	1 6
1 bottle containing 1,000 units (U.S.A.)	2 6
1 bottle containing 1,500 units (U.S.A.)	3 6
1 bottle containing 5,000 units (U.S.A.)	7 9
1 bottle containing 10,000 units (U.S.A.)	14 6

2. *Veterinary Tetanus Toxoid* (to give a life-long immunity commencing two weeks after injection).

Doses—Horses—10 c.c.
Cattle—10 c.c.
Sheep—1 c.c.

Available in bottles as follows:—	Price. s. d.
1 bottle containing 10 c.c.	1 3
1 bottle containing 250 c.c.	22 6

Both products can be obtained from the Commonwealth Health Laboratory at Brisbane, Toowoomba, Rockhampton, Townsville, and Cairns, or direct from the Commonwealth Serum Laboratories, Parkville, Victoria.

Sunflower Poisoning.

MARSHALL R. IRVING.

IN December serious mortality in travelling sheep occurred on the Darling Downs, the cause of which proved to be the Wild Sunflower (*Verbesina encelioides*), sometimes known also as Crown Beard. Of a mob of 1,290 merino weaners carrying seven months wool deaths totalling about 320, or 25 per cent., occurred within two days following an exposure to a patch of Sunflower for a few minutes only.

The history of the case is as follows:—

The weaners were mustered one evening and started on the road the following morning. During this first day they travelled 12½ miles

to camping yards over fairly good feed, except during the last couple of miles. They were watered at sundown and yarded for the night. Next morning, on breaking camp at daybreak, they strung along a bare stock route to the first gate about 1½ miles away. At the gate was about an acre of Wild Sunflower growing in profusion, and when inspected a few days later this crop was found to have been well trimmed by the mob. The Sunflower was in all stages of growth, from small seedlings to flowering plants about 2 feet high.

Passing through the gate the mob moved another 5½ miles over fairly good feed to a bare, dry lunch camp without mishap. After a three hours spell the sheep moved off again, and had gone only three-quarters of a mile when trouble started.

The first symptoms noted by the drover were the heads depressed, a stiffness or paralysis of the forequarters, staggering, and about forty head started to go down. The mob was pulled up for one and a-half hours, and when they moved again sixty were left prostrate and forty staggered along behind the mob.

By sundown on the second day the sheep had covered only 3 miles from the lunch camp and over 100 had been dropped. The prostrate sheep held their heads firmly round on their sides, struggled frequently to rise, showed marked respiratory distress and frothing from the nose, and were quite paralysed in the forequarters.

By next morning over 100 weaners had died, 200 were prostrate, and over half the remainder showed symptoms of sickness. All healthy and "walking-sick" were put into an adjacent paddock.

By sundown on the third day deaths had reached 170, and continued through the night until they ceased the next day with a total of over 300. Signs of recovery appeared on this fourth day, and within three days little signs of sickness were visible in the survivors.

Post-mortem examination by the owner showed only congestion of the lungs and blood-stained fæces in the lower bowel. Attempts at treatment with hypo solution only accelerated death, and it was found that forcing sick sheep to move caused more to go down.

This is characteristic of poisoning by Sunflower. The best course is to leave sick sheep undisturbed, and most will recover. Attempts at treatment or forcing the sheep to move only accelerate death and increase the mortality.

Although other poisonous plants were found on the stock route, there is no doubt that the Wild Sunflower was the cause of the mortality.

Description of Wild Sunflower (*Verbesina encelioides*).—The plant may be described as a small edition of the common garden sunflower, having the same erect stem, pale-green, hairy leaves, and a bright-yellow sunflower head up to 2 inches in diameter. The plant grows to about 2 feet in height and is fairly common on the Western Darling Downs and Maranoa districts. Its chief danger is to travelling stock and it is not usually eaten by paddocked sheep.

LIVESTOCK GESTATION TABLE.

The figures in the first column indicate the times of service, and those in the others the dates on which the animals of the respective breeds are due to produce their young.

Time of Service.	Sows 114 Days.	Cows 283 Days.	Mares 340 Days.	Ewes 150 Days.
January 1	April 24	Oct. 10	Dec. 6	May 30
January 6	April 29	Oct. 15	Dec. 11	June 4
January 11	May 4	Oct. 20	Dec. 16	June 9
January 16	May 9	Oct. 25	Dec. 21	June 14
January 21	May 14	Oct. 30	Dec. 26	June 19
January 26	May 19	Nov. 4	Dec. 31	June 24
January 31	May 24	Nov. 9	Jan. 5	June 29
February 5	May 29	Nov. 14	Jan. 10	July 4
February 10	June 3	Nov. 19	Jan. 15	July 9
February 15	June 8	Nov. 24	Jan. 20	July 14
February 20	June 13	Nov. 29	Jan. 25	July 19
February 25	June 18	Dec. 4	Jan. 30	July 24
March 2	June 23	Dec. 9	Feb. 4	July 29
March 7	June 28	Dec. 14	Feb. 9	Aug. 3
March 12	July 3	Dec. 19	Feb. 14	Aug. 8
March 17	July 8	Dec. 24	Feb. 19	Aug. 13
March 22	July 13	Dec. 29	Feb. 24	Aug. 18
March 27	July 18	Jan. 3	Mar. 1	Aug. 23
April 1	July 23	Jan. 8	Mar. 6	Aug. 28
April 6	July 28	Jan. 13	Mar. 11	Sept. 3
April 11	Aug. 2	Jan. 18	Mar. 16	Sept. 7
April 16	Aug. 7	Jan. 23	Mar. 21	Sept. 12
April 21	Aug. 12	Jan. 28	Mar. 26	Sept. 17
April 26	Aug. 17	Feb. 2	Mar. 31	Sept. 22
May 1	Aug. 22	Feb. 7	April 5	Sept. 27
May 6	Aug. 27	Feb. 12	April 10	Oct. 2
May 11	Sept. 1	Feb. 17	April 15	Oct. 7
May 16	Sept. 6	Feb. 22	April 20	Oct. 12
May 21	Sept. 11	Feb. 27	April 25	Oct. 17
May 26	Sept. 16	Mar. 4	April 30	Oct. 22
May 31	Sept. 21	Mar. 9	May 5	Oct. 27
June 5	Sept. 26	Mar. 14	May 10	Nov. 1
June 10	Oct. 1	Mar. 19	May 15	Nov. 6
June 15	Oct. 6	Mar. 24	May 20	Nov. 11
Jun 20	Oct. 11	Mar. 29	May 25	Nov. 16
June 25	Oct. 16	April 3	May 30	Nov. 21
June 30	Oct. 21	April 8	June 4	Nov. 26
July 5	Oct. 26	April 13	June 9	Dec. 1
July 10	Oct. 31	April 18	June 14	Dec. 6
July 15	Nov. 5	April 23	June 19	Dec. 11
July 20	Nov. 10	April 28	June 24	Dec. 16
July 25	Nov. 15	May 3	June 29	Dec. 21
July 30	Nov. 20	May 8	July 4	Dec. 26
August 4	Nov. 25	May 13	July 9	Dec. 31
August 9	Nov. 30	May 18	July 14	Jan. 5
August 14	Dec. 5	May 23	July 19	Jan. 10
August 19	Dec. 10	May 28	July 24	Jan. 15
August 24	Dec. 15	June 2	July 29	Jan. 20
August 29	Dec. 20	June 7	Aug. 3	Jan. 25
September 3	Dec. 25	June 12	Aug. 8	Jan. 30
September 8	Dec. 30	June 17	Aug. 13	Feb. 4
September 13	Jan. 4	June 22	Aug. 18	Feb. 9
September 18	Jan. 9	June 27	Aug. 23	Feb. 14
September 23	Jan. 14	July 2	Aug. 28	Feb. 19
September 28	Jan. 19	July 7	Sept. 22	Feb. 24
October 3	Jan. 24	July 12	Sept. 7	Mar. 1
October 8	Jan. 29	July 17	Sept. 12	Mar. 6
October 13	Feb. 3	July 22	Sept. 17	Mar. 11
October 18	Feb. 8	July 27	Sept. 22	Mar. 16
October 23	Feb. 13	Aug. 1	Sept. 27	Mar. 21
October 28	Feb. 18	Aug. 6	Oct. 2	Mar. 26
November 2	Feb. 23	Aug. 11	Oct. 7	Mar. 31
November 7	Feb. 28	Aug. 16	Oct. 12	April 5
November 12	Mar. 5	Aug. 21	Oct. 17	April 10
November 17	Mar. 10	Aug. 26	Oct. 22	April 15
November 22	Mar. 15	Aug. 31	Oct. 27	April 20
November 27	Mar. 20	Sept. 5	Nov. 1	April 25
December 2	Mar. 25	Sept. 10	Nov. 6	April 30
December 7	Mar. 30	Sept. 15	Nov. 11	May 5
December 12	April 4	Sept. 20	Nov. 16	May 10
December 17	April 9	Sept. 25	Nov. 21	May 15
December 22	April 14	Sept. 30	Nov. 26	May 20
December 27	April 19	Oct. 5	Dec. 1	May 25
December 31	April 23	Oct. 9	Dec. 5	May 29

War Agricultural Committee Notes.

FOLLOWING are extracts from a recent communication from the Federal Ministry of Supply and Shipping:—

The Rubber Position.

The monthly quota of pneumatic tyres and tubes to Queensland is based on exactly the same formula as are supplies to other States; that is to say, the supply made available to each State from time to time is a percentage of the tyres and tubes sold within that State in the basic months of September, October, and November, 1941—the period immediately preceding the Japanese entry into the war. This percentage, of course, does not allow any tyres whatsoever for private purposes, the latter in the main being served with second-hand tyres, retreads, and recaps. In fixing quotas, it was also realised that all forms of rationalisation of transport, pooling of vehicles and community carting, would need to be provided for to the fullest possible extent in order to avoid any serious breakdown of essential transportation.

The importance of the land industries was fully realised, and, largely, the primary producers' priority has been sufficient in most States to ensure that essential vehicles are maintained.

Community Carting.

An examination of the outstanding applications from primary producers disclosed that action taken to institute community carting to the fullest possible extent had been incomplete, many of the applications being from small farmers in districts near to Brisbane and other main towns where community carting is generally quite practicable and satisfactory—it has proved to be so in other States. It is realised, of course, that this would not apply in the case of isolated farms in outlying districts, and also on large stations where certain vehicles are necessary for the upkeep of water bores which must be kept in working order, and it is appreciated that in such cases care must be taken to ensure maintenance of essential vehicles.

Alternative Transportation.

Applicants in localities where regular transport facilities exist have been informed that there were not enough tyres available to satisfy all essential demands and the possibility of some alternative means of transport, such as established carrying services, or horse-drawn vehicles, or the joint use of one vehicle for a number of essential users, should be considered, and in this connection they were asked to collaborate with the local transport authority in their district. Where all means of alternative transportation had been examined and there was no escape from the use of the vehicle in respect of which the application for tyres was made, then the applicant was asked to supply further particulars as to distance from local centres, necessity to make essential visits, and number of journeys a month to the local transport authority for reconsideration and recommendation. Until the result is known specifically, it will be difficult to say just what extra tyres will be really necessary in Queensland; but, because of certain savings and cutting down in other States, it may be possible over the next few months to make available in Queensland additional passenger and commercial utility type tyres in the sizes mainly needed by the farming community. Whilst this will not solve the whole problem, it will at least alleviate the position.

Vigorous action towards pooling and community carting among primary producers would be appreciated, as offering the best prospect of ensuring that really essential tyre requirements are supplied. This has been done to a very large extent in other States, and without it the transport system would have probably broken down because it would not have been—nor is it now—possible to supply all the tyres and tubes required. Community carting in Queensland, therefore, assists materially in easing the tyre position.

NOTICE TO READERS.

Because of the present necessity for strict economy in the use of paper, readers are requested to renew their subscriptions promptly. If renewals are unduly delayed, it may be impossible to supply back numbers of the Journal.

Address all renewals and other correspondence to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Rural Topics

Britain's Wartime Agriculture.

A 70 per cent. increase in the net output from the soil of the United Kingdom, measured in the all-important calories, indicates the important part which British farmers are playing in this war. The increased production has been achieved despite a 2 per cent. reduction in the area of cultivated land. The additional area brought under cultivation by reclamation has been more than offset by the loss of cultivated land to military and industrial use.

The increase has been achieved despite the fall in the number of male agricultural workers. Greatly increased mechanisation of production and the willingness of the remaining workers to work harder has more than compensated for the loss of manpower.

The pattern of British agriculture has been considerably modified. Cereals, potatoes, and crops used for milk production are first priority products. Milk is being produced in record volume.

The acreages of various crops in 1942, expressed as a percentage of pre-war acreages, were:—

	Per Cent.
Wheat	136
Oats	172
Cereals	176
Potatoes	180
Vegetables	185

Imports of animal feeding stuffs have declined from 8.5 million tons pre-war to 1.5 million tons in 1942, with a consequent decline in total livestock numbers. These numbers in 1942, expressed as a percentage of pre-war, were:—

	Per Cent.
Cattle	105
Sheep	82
Pigs	48
Poultry	76

The present trend of opinion in the United Kingdom is in favour of maintaining British agriculture after the war at the present increased production level. This would be facilitated by reversion to agriculture of lands now used by the services, and to a less extent by industry.

The Women's Land Army in the United Kingdom numbered 65,400 at the end of May, 1943.

Producers who have increased their milk sales of 1942-43 by more than 10 per cent. will receive a Diploma from the Ministry of Agriculture of the United Kingdom, reading as follows:—

> "This Diploma is awarded to the farmer and farm workers of..... in the County of.....in recognition of their loyal work for their country in its time of need. The milk production of this farm showed an increase of more than.....per cent. over the previous year."

A Home-made Milk Safe.

Here is an idea for a home-made milk safe for keeping milk cool in the warm weather: Take a kerosene tin and cut out the sides, merely leaving the corner pieces for towelling and to hold a water basin on top. Sufficient towelling should be provided to cover the sides entirely, and it should be provided with a draw thread. Wring out the towelling in cold water and place it around the tin and draw the thread tight over the top. Place a basin of water on top of the tin and use strips of towelling to allow the water to reach the covering on the sides. Make a hole at

each corner of the tin and fasten a bit of wire about a foot long through the hole in each corner. Then collect the four wires in the centre and fasten them to a metal ring for a hook to hold the safe. The safe should be hung in a shady and draughty place.

Souring of milk is caused by tiny germs which are always present in the milk. These germs multiply rapidly in warm milk, but their growth is checked if the milk is cold.

Australia Delivers the Goods.

From the outbreak of war to 31st March, 1943, Australia had shipped foodstuffs and beverages worth £208,615,000 to all overseas destinations—to Britain, to other parts of the Empire, and to Allied countries.

Of this total, exports to Britain accounted for £118,698,000, or 56.89 per cent. of all the foodstuffs shipped.

Setting the Plough Right.

Every point in farm economy is important these days, and the proper setting of a plough is one of those points. It has been found that, through faulty setting, the draught of many tractor ploughs in every-day use on farms is as much as 300 lb. weight more than it need be. An extra 150 lb. of draught at ordinary ploughing speed means that the tractor must develop an extra horse-power at the drawbar, and that it will use an extra gallon of fuel a day without useful return. It follows, then, that faulty plough-setting is the cause of many tractors wasting as much as 2 gallons of fuel a day. Not only that, but the ploughing isn't as good as it ought to be. Both fuel wastage and poor ploughing can be avoided by keeping to the simple rules of good ploughing, the first of which is to see that the plough is set right. District agricultural instructors are always ready and willing to give advice on these matters if advice is needed. An experienced neighbour will also, no doubt, gladly help a less-experienced farmer out of any little difficulty in setting a plough right.

Australian Workers Helped a Record British Harvest.

Workers in Australian agricultural machinery plants had a lot to do with making a success of Britain's record harvest of last season, for one out of every five of the hundreds of new binders used in getting in the Old Country's heaviest wheat crop came out of Australian workshops. That is another way, not commonly known, in which we have been happily helping in keeping Britain's bread basket full. As Ruskin wrote, "there are soldiers of the ploughshare as well as soldiers of the sword."

In a remote part of England a combine harvester had not been seen before. One old farm worker, seeing an Australian combine for the first time, thought it was "something for those Army and Air Force boys," but after having the workings of the machine explained to him, said, "Ah, well, it's a grand tool. Likely they'll have one next harvest to turn out a loaf of bread at one end and a bottle o' beer at t'other end!"

Rather optimistic, perhaps, but if a combine were built that way it would certainly solve a storage problem for a harvest festival.

Planning for Rebuilding and Development after the War.

While the first and biggest job is to win the war, it is generally agreed that, without diverting energies from the greatest task, it is necessary to give deep thought to rebuilding and development plans which should take shape before the inevitable post-war problems arise. Two obvious things to do are to prepare the ground for rebuilding and provide for the necessary organisation. That means getting busy on a research programme and on devising the necessary machinery for the working of whatever plans are evolved. In our post-war planning it is important that we should not be handicapped through lack of technical information, through confusion of social and economic values, or through the absence of effective administrative machinery. It is necessary, therefore, to investigate actual or prospective needs in regard to post-war planning, to work out ways and means of meeting those needs, and to consider the setting up of efficient machinery for putting post-war plans into effect. Boiled down, no matter how closely occupied we may be with war-time tasks, we still have to realise the wisdom of preparing for peace. The job of sane, clear thinking, and patient, fearless, unprejudiced exposition of post-war problems demands the co-operation of all.

Our Women Food Producers.

Women on the land will be numbered among the highest contributors to national service when the full story of the war in Australia is presented. On many a farm and grazing property, women and girls have been courageously carrying on the work of essential food production without any thought of glamour ever since the war started. Besides keeping the home fires burning, they have cheerfully and effectively shouldered the burden of farm and pastoral management. Even on the stock routes women drovers are no uncommon sight, and there is scarcely a branch of primary production in which they have not taken a full and competent share. The Country Women's Association can tell of many a farm run entirely by women who, in addition to maintaining their well-organized homes as centres of real culture and looking after young families, are directing and doing all sorts of field work with skill and common sense, as well as finding time in their crowded day to take their part in community affairs. Women of Australia, like women of Britain, are right in the front rank of food producers who are pooling their brains and their resources in a full-powered drive for victory.

The Sting of the "Wasps."

In addition to country women working their own farms, there is the Women's Land Army, a mobile organization ready for service where the need of farm workers is most urgent, and linked with other women's auxiliaries. Among these auxiliaries is the Women's Agricultural Security Production Service, otherwise known as "WASPS," a New South Wales organization whose field of operations is not very far below the Queensland Border. Most of its members are town girls who, on very short notice, go to farms in the surrounding district to help in planting and harvesting crops on which there is always a weather limit. The "WASPS," who put plenty of "sting" into their work, travel out to their voluntary farm jobs and return to their homes each day and so solve one of agriculture's present-day problems —accommodation of emergency farm workers. The assurance the "WASPS" give to the district farmers is "plant what crops the nation wants and we'll guarantee to harvest them."

Front Line Farming in England.

In one English county alone tens of thousands of bombs have landed on the farms, to say nothing of shot-down German planes. Land girls working on these farms have been issued with "tin hats," and some of them have been strafed again and again while driving tractors near the coast, but have never been scared off their job—more evidence of the undefeatability of the spirit of Britain. It also may be evidence, perhaps that the arms of Mars are jealous of the arms of Ceres!—From *Farm Implement and Machinery Review* (England).

A Pig Responsibility.

More than any other animal, the pig depends on his owner for the conditions under which he lives. Dirt isn't the pig's responsibility; it's the responsibility of the man who looks after the pig. It will be many years before we breed pigs capable of cleaning out their own sty and then taking a shower bath without assistance.

Where to Put the Branding Iron.

The greater care now given to the branding of cattle means that we are well on the way towards preventing the enormous loss—said to run into hundreds of thousands of pounds a year in the aggregate—caused by careless and faulty branding—that is, branding on the rump or other valuable parts of the hide, and the use of unnecessarily large brands. At a time like the present, when all forms of waste should be cut out, it goes without saying that the benefit of correct branding will be acknowledged by every cattleman. Correct branding reduces the waste in a hide and so increases its value to the tanner, and, therefore, to the stockowner.

The Goat Becomes Respectable.

In Queensland, especially around mining centres, the goat has long been looked on as a domestic necessity, not only as a milk producer, but also as a "mutton" producer. In Britain, a movement to make the goat more popular as a milk and butter producer has advanced rapidly. Over there the development of goat-breeding from a milk-producing standpoint has resulted in some extraordinary milk yields which have been officially recorded. Small landholders have found it easy to add to the family's rationed food supply by keeping a goat or two for both milk and butter and the cost of maintenance is scarcely worth mentioning.

Bottle-fed Calves.

Getting tired of bucket-feeding his calves and trying to dodge the trouble of breaking them in to drink for themselves, a South Coast dairy farmer has gone back to the old method of rearing poddies on the bottle. He got some quart bottles (empty, of course!) and fills them for every feeding with warm milk fresh from the cows to the quantity required according to the age of the calves. On each bottle an ordinary feeding nipple has been placed. The bottles are suspended in a rack made especially for the purpose, and the poddies are simply left to it.

This farmer finds his bottle-fed calves thrive better than when he had them on the bucket. They soon learn to suck from the bottle, and now always wait around the rack about the regular feeding time. By using bottles an extra ration can be given to each calf, and this saves, not only milk, but the tiresome task of teaching the poddies to drink by the old finger method. Another thing, too—the calves get their nourishment quite normally and it is not gulped. There is no chance of a dirty hand being plunged into the milk, and no spill-over through the calves butting into the feeding bucket. The fly in the ointment, however, is the probable scarcity of rubber nipples these days.

Much of the benefit of bottle-feeding comes from the fact that the milk taken in small quantities passes naturally to the true stomach of the animal and is more easily digested. In bucket-feeding, the milk is gulped so quickly that a lot of it is forced into the poddy's paunch, where it may cause a lot of digestive trouble, leading to scouring and other disorders. Calves should be kept on the bottle until weaning time arrives. During this critical time in a calf's life, a small amount of lime water and sometimes a tablespoonful of cod liver oil (or a wartime substitute) may be added to the milk. The bottles should be kept scrupulously clean, as with any other dairy utensil, and sterilized after each feeding and then left on a rack to dry.

The Kelpie and Heeler—Australian Working Dogs.

The following abridgment of an article by "Canis Major" in the *Australasian* (Melbourne) will interest Queensland sheep and cattle men:—

There is a wide variety among the world's sheep and cattle dogs, but of all the beautiful and useful dogs used few, if any, could excel in sagacity and endurance our Australian dogs, the heeler and the kelpie.

With breeds evolved so recently in our own country, it is surprising that so little is known generally about them. Versions of the breeds used in the production of these dogs differ according to the authority. It is claimed that different types of Scottish working dogs were inter-bred. It is generally agreed that the Scotch collie, not the show-bench variety, but the working type, and a short-haired, prick-eared lurcher, were among the most important of the kelpie's progenitors.

Those who have watched kelpies competing with Border collies in sheep-dog trials at agricultural shows should remember that this tactful working of sheep around obstacles and through gateways is simple work compared with that expected of dogs when droving sheep along stock routes. Uncanny in its intelligence and untiring in its effort, the kelpie may travel anything from 30 to 100 miles, while the sheep cover only 10 miles.

The endurance shown by the kelpie, toiling all day over miles of dry country, shows that it has even greater vitality and fortitude than the Border collie, recognised as the world's best worker of sheep.

A TOUGH WORKER.

Breeders of heelers like telling us that the introduction of dingo blood has had a big influence in providing the heeler with that quiet, subtle cunning that enables it to glide in and out among the hooves of wild heifers and steers without any apparent fear. There is no dog tougher, hardier, more intelligent, or willing to work than our Australian heeler. The dog seems capable of enduring the most prolonged periods of work under the severest conditions.

Most of the work of droving is often done by the dogs. A nip on the heel from the silent heeler brings a speedy return to the track of any would-be strays or stock that might lag behind.

Both kelpies and cattle dogs are active and alert. For their work and to comply with show-ring standards, both breeds must have muscular substance, without any appearance of coarseness. Dogs should measure about 18 inches to 20 inches at the shoulder, and bitches an inch or so less. The coat of the kelpie should be moderately short, flat, smooth, and weather-resisting, with a dense undercoat. Kelpies are black, black-and-tan, red, red-and-tan, fawn, chocolate and smoke-blue.

The heeler should show more muscular development than the kelpie. It has a thick undercoat. The coat should be profuse behind the legs but smooth, straight, and short elsewhere. Colours in the heeler are described as red-speckled and blue-mottled, the latter colour predominating in numbers.

Knots to Know

CHAIN HITCHES.

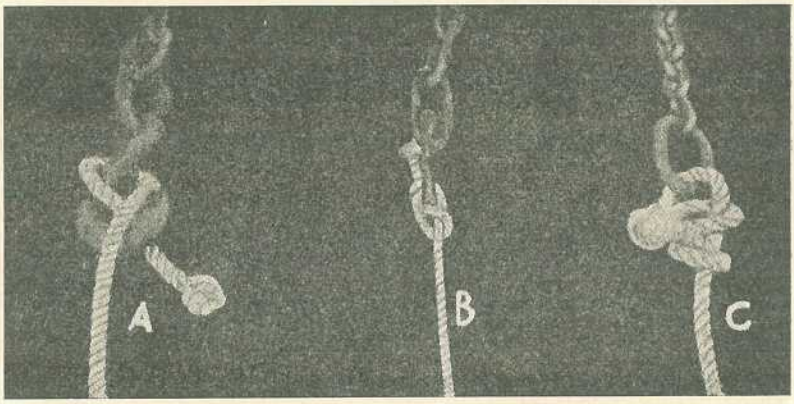


Plate 51.

CHAIN HITCHES.—Three methods.

Where it is required to hitch a rope to a chain, this can be done very simply and expeditiously as in Fig. A.

Fig. B shows a useful hitch for joining a rope to a closed link. This hitch will not slip in use, but it may work loose if the chain is left slack. It is intended chiefly for temporary work. The hitch shown in Fig. C is absolutely slip-proof and is well suited for a permanent join.

CLOVE AND TIMBER HITCHES.

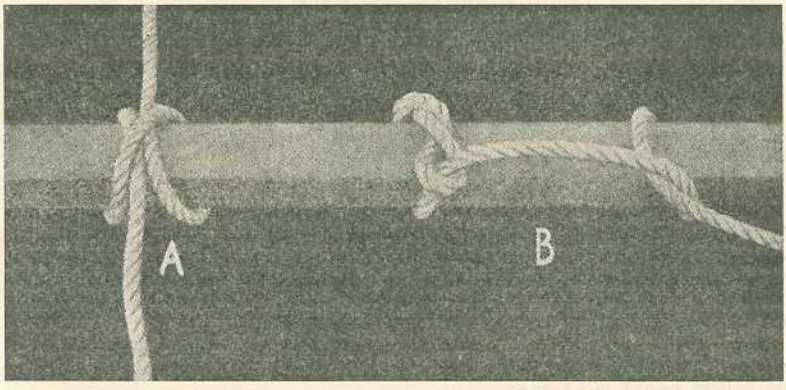


Plate 52.

CLOVE AND TIMBER HITCHES.

Hitches may be very conveniently used for lifting timber, or for holding a strain.

The clove hitch (Plate 52, Fig. A) is very simple and easily applied, but it is liable to slip, particularly if the rope is wet. The timber hitch as shown in Fig. B is safer in use, though rather more difficult to apply. It is commenced by an ordinary hitch as in Fig. A, the short end of the rope being then led some distance along the load when it is turned round to form a hitch, being finally tucked for several turns between the hitch and the load.

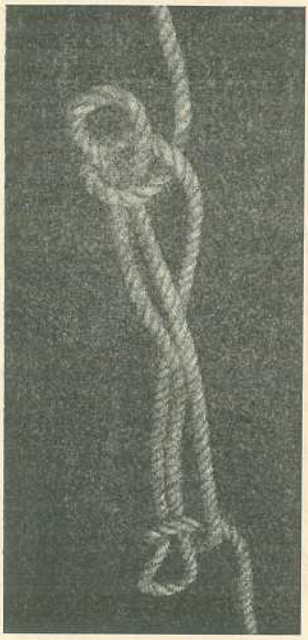


Plate 53.
Sheep Shank.

SHEEP SHANK.

This is a variation of the hay knot, and is well suited for shortening a rope without cutting it. It is commenced in the same way as the hay knot, and is completed with a hitch round the bottom of the loop exactly similar to the first hitch at the top (see Plate 53).

The sheep shank will not slip under strain unless either of the ends of the loop is pushed through the hitch. It can be made secure and permanent by hitching the loop ends round the rope.

ROLLING HITCH.

This is regarded as the safest of all hitches, and is very commonly used for handling round timber. It is also useful for hitching an animal to a post or to a picket line, as in addition to being perfectly secure, it will not slip in any direction—either round or sideways. It can be very easily undone when the strain is removed. (See Plate 54.)

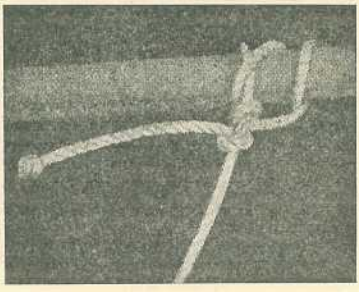


Plate 54.
Rolling Hitch.

BOTTLE-NECK HITCH.

This is at times useful when it is required to raise a barrel or tank in a vertical position, as for lifting water or for earthing a stack of silage (see Plate 55).

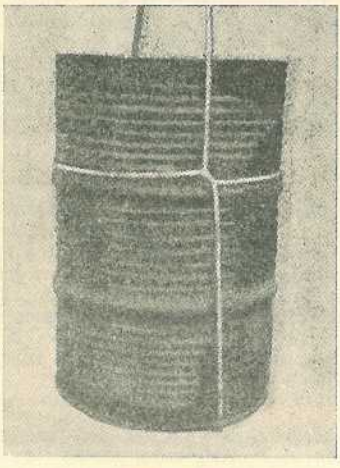


Plate 55.
Bottle-neck Hitch.

GADGETS AND WRINKLES

PULLING POSTS WITH HORSE POWER.

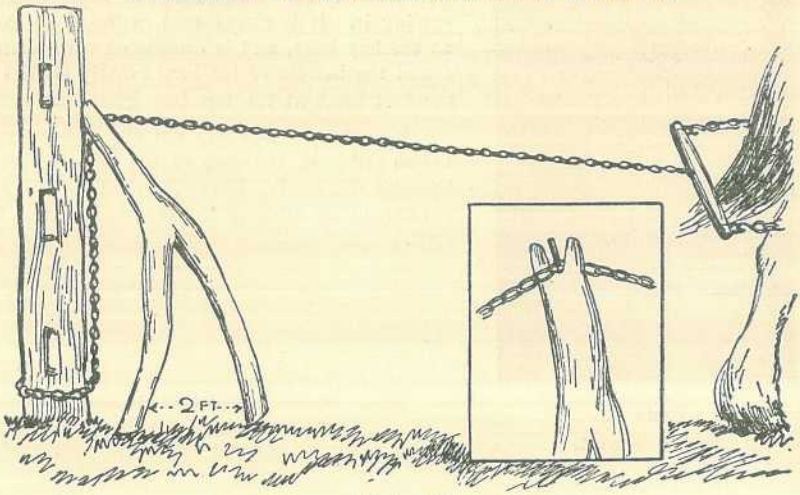


Plate 56.

With this method of pulling out old fence posts, a stout fork, as illustrated, is used as a fulcrum. If it has a bend in it, so much the better. Both legs of the fork should stand firmly on the ground, with the top or shank of the fork leaning against the post to be pulled out. The fork should be about 4 feet long and its prongs with a spread of about 2 feet. The "toe" of each prong should be placed about 2 feet 6 inches from the post at ground level. Each "toe" should be cut at an angle, so that it will "spade" itself into the ground and not slip. In the shank of the fork a V should be cut into the top or tip and a hole bored (see inset detail), so that a pin may be fitted into any link of the chain used for the job. The chain should be pulled as tightly as possible between the turn round the bottom of the post and the V in the shank of the fork, as shown in the sketch. For this method of post pulling, it is claimed that one man with a good, steady draught horse can easily yank out a mile of posts a day.

WATER TRAP FOR MICE.

The sketch at the right illustrates how easily an effective mouse trap can be made. The requirements are a few cotton reels (or cocoa tins with lids on), a short length of stout fencing wire, a board 2 or 3 inches wide and long enough for a ramp or runway leading from the ground to the top of the tin, a short length of thin wire, and a bit of cheese for bait.

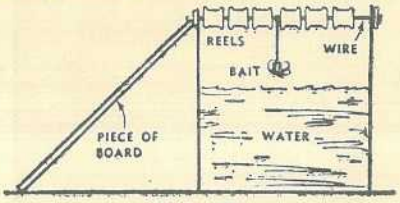


Plate 57.

Holes should be punched through two opposite sides of the tin, then the short length of fencing wire passed through one of the holes, the cotton reels threaded on, and the wire passed through the other hole in the tin. The board for the ramp or runway is placed at an angle (as shown in the sketch). The bait is suspended by the thin wire from the axle. To get at the bait, mice will go up the board on to the reels, to be tipped into water below. A little grease on the wire axle will cause the reels to revolve rapidly. What happens to the mice is obvious.

Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

BABY'S HEALTH: NATION'S WEALTH.

Understanding Children.

FROM birth to the age of five years is a very important period in the development of the emotional life of the child. The feelings of the young child are very intense, his affection very strong, his need of the love and care of parents and others very great. He has neither the experience nor the knowledge to help himself to control his feelings. He is subject to acute fears—fears of animals, of people, of noises, of the dark, and so on. He may wake up or partly wake up screaming with terror without any understandable cause. He may suffer from a breakdown in habits of cleanliness when there is an upset in the home or some change in the surroundings or routine, or when a new baby arrives or some loved person is removed. The young child tries to make his many needs known to those about him, but so often they do not understand, and he finds it hard to hold his own amongst those who are bigger and stronger than himself. It is well for everyone who has the care of young children to realise that behaviour problems due to some emotional experience through which the child is passing are bound to occur and that they should be treated with patience, consideration, and sympathetic understanding. The present is a difficult time for many—families are living in rooms and flats, homes are being shared and the divided control and management of children are producing problems, food has to be called for, mothers with several young children whose husbands are away from home on military or other essential war service are battling along often unaided. All honour is due to those serving on the home front and the following observations and suggestions are made with the view of helping them.

1. An infant is very sensitive to his mother's state of mind. If she is calm, possesses self-control, and handles her baby with patience, understanding, and wisely-directed affection, he is likely to develop a feeling of confidence and contentment and a stable disposition.

2. One person in the home should be responsible for the child's up-bringing, if possible the mother. If both parents are at home, they should agree on the methods employed.

3. Avoid discussing the child in his presence. To retail his funny sayings and doings only makes him self-conscious, unnatural, and less straightforward in his behaviour.

4. A mother should avoid trying to keep her child's affection to herself otherwise she will not only make a rod for her own back, but she will retard the child's healthy development. The child should learn to care for others and enjoy their company.

5. Prepare the children, particularly the youngest child, for the coming of the new baby by trying to interest them in babies and telling them how nice it would be to have a baby of their own. It is extremely upsetting for an eighteen-months-old toddler who has had all the attention to see a little stranger taking his place in his mother's arms. The jealousy of a little child should not be merely considered amusing, for it may have very harmful effects on the development of his character. Therefore, give the toddler a fair share of consideration and attention and teach him to help to care for the new baby.

6. Avoid saying or doing things which it is not desired that children should say or do. Children are clever imitators.

7. Train the child to share with others, to give his brother or sister a portion of what he has, but do not expect too much of him in this way until he reaches the age of three or four years.

8. Avoid "tricking" a child into doing what he is told—to take a spoonful of jam when you know he will dislike the taste of the medicine in it. Still more, do not promise him some treat which it is not intended to give him. Above all, be truthful, otherwise the child cannot be expected to tell the truth.

9. Do not frighten a child into obedience, particularly by threatening him with nasty medicine, with a visit to the doctor, or with sending for the police.

10. Consider carefully the kind of things asked of a child to do or not to do. For example, it would be unreasonable to expect a young child to keep still. If he is doing things he is not wanted to do, provide some other form of occupation. Avoid frustrating him at every turn by continually saying "don't." Once it is decided that a request is reasonable, let the child understand that you mean what you say and expect obedience.

11. Encourage a toddler to do things for himself, for it is in this way that he learns and becomes independent. This often requires time and patience on a parent's part. Be ready to give assistance when he requires it and refrain from saying, "I knew you couldn't," which only tends to make him lose confidence in himself.

12. Encourage a child to face difficulties and difficult situations. For example, if it has been arranged with him to perform an unpleasant task or to keep an unpleasant appointment and, when the time approaches, he complains that he is not feeling well and it is known that he is not really ill, treat him sympathetically by telling him that you are sorry but the task must be carried out or the appointment kept. By all means give him all the assistance and reassurance he needs. In this way you will be helping him to develop courage.

If you have cultivated a spirit of comradeship with your children, you will find them easier to understand and manage.

Questions on this or any other matter concerning Maternal and Child Welfare will be answered by communicating personally with the Maternal and Child Welfare Information Bureau, 184 St. Paul's terrace, Brisbane, or by addressing letters "Baby Clinic, Brisbane." These letters need not be stamped.

CEMENTING BAGGING.

Good weather and windproof barriers can be made by coating bagging or hessian with cement. The material, however, will remain waterproof only if kept in vertical or steeply sloping position. The framework should provide for easy placement of the hessian. The mixture may vary from equal parts of cement and fine sand to three parts cement to one part sand for an especially smooth job. Equal parts of each are ordinarily satisfactory. The sand should be finely sieved. For the final coat, use three of cement to one of sand.

To tighten it should be wetted, and the coat applied with stiff scrubbing brush. After the first coat has dried sufficiently—not too dry—the second coat should be applied. The hessian should be sprayed with water after each coat of cement has been brushed on with whitewash brush. The hessian should be tacked along each edge to uprights. Best results are obtained on a dull day. While drying in warm weather the cemented hessian should be sprayed with water to prevent cracking. If wire netting is stretched across timber under the hessian, a firmer cover will result. Cemented hessian is suitable for roofing, but rafters and purlings should be firm and a final coat of bitumen (if available) is advised.

Plate 58.

STARTING A "DIG FOR VICTORY" GARDEN IN A BRISBANE SUBURB.—These girls, employed in city offices and shops, spend their spare time growing vegetables for military hospitals.

Plate 59.

CONTOUR CULTIVATION.—This terraced garden in a Brisbane suburb is evidence of the enterprise of "Dig for Victory" girls, whose week-end industry produces high yields from hard and stoney ground.

IN THE FARM KITCHEN.

Cream of Tomato Soup.

Wash 1½ lb. tomatoes and cut up roughly. Put in a saucepan with 1 blade of whole mace, 2 cloves, a small minced onion, and 2 bay leaves, salt and pepper to taste, and a pinch of bicarbonate of soda. Cook gently until tender, remove bay leaves, &c., and rub through a fine sieve. Melt 2 dessertspoons butter in a saucepan, add 1 tablespoon plain flour, cook a little, then add 2 pints warm milk. Stir until it thickens and then allow to simmer for 5 minutes. Now add puree and carefully reheat. A little sugar may be added, also a little cream. On no account allow the soup to boil or the soup will curdle.

Medley Stew.

Fry 2 large minced onions in bacon fat until brown, add ½ lb. minced steak, free from fat, and stir all the time while cooking so as to keep particles of meat separate. Add 2 cups cooked spaghetti and 4 sliced and cooked tomatoes. Melt ¾ cup grated cheese in 1 medium-size tin tomato soup, add 1 tablespoon any good relish and a little clove of garlic (optional). Add soup, &c., to meat, stir until well blended, adding more salt and pepper if necessary. Serve piping hot with fingers of toast or fried bread.

Savoury Fritters.

Make a mixture as follows:—Place 1 oz. butter in saucepan with ½ cup water and bring to boiling point. When butter is quite melted, add 2 oz. plain flour and stir over gas until it leaves the sides of saucepan clean. Allow to cool a little, then beat in 2 whole eggs, one at a time, and beating well after each egg is added. Add pepper and salt to taste, and, if liked, a little chopped parsley. Drop in dessertspoonfuls in very hot, but not boiling, fat and cook over a moderate gas until well risen, brown, and crisp. Take up and drain. Fill with any left-over meat, vegetable, &c., finely chopped and well flavoured, and mixed with enough sauce to bind mixture together. Make hot before filling puffs, then serve at once with a well-flavoured sauce.

Meat Roly Poly.

Take 4 oz. shredded suet, ½ lb. liver or cold meat, 1 onion, 1 gill water, ½ lb. flour, ½ teaspoon salt, 1 gill gravy or stock.

Chop the liver or meat and onion. Mix with flour, shredded suet and salt. Moisten with the water to make a fairly stiff paste, roll lightly and shape into a roll. Lay roll on a scalded and floured pudding cloth. Roll up in cloth and secure ends tightly. Place in a saucepan of boiling water, and boil for 2 hours. When cooked, remove cloth and serve with the gravy or rich stock heated and poured over. Enough for two or three persons.

Baked Cabbage.

Shred a fairly large cabbage finely and soak in cold salted water until crisp. Drain well and put in a large saucepan with a tablespoon butter, pepper, and salt to taste. Cover well with a tight-fitting lid and cook until tender. Stir now and again during the cooking to prevent burning. Allow to cool, then add 2 well-beaten eggs, 1 tablespoon shredded and fried bacon, a little grated nutmeg. Well grease an ovenproof dish or basin and sprinkle thickly with brown breadcrumbs. Fill centre with the cabbage and cover with more breadcrumbs. Bake in a hot oven for half an hour, turn out and serve with brown sauce or as a vegetable to serve with roast meat.

Baked Rhubarb Pudding.

Stew 1 bunch rhubarb in the usual way, using as little water as possible. Remove the crust from stale white bread and weigh 1 lb. Cover this with just enough milk and when quite soft squeeze out until almost dry. Mix this with 2 oz. finely-grated suet, 2 oz. sugar, and 1 beaten egg. Line a well-greased round cake tin with this mixture, reserving enough for top. Fill with rhubarb, then cover with the remaining bread mixture. Bake in a moderate oven for 1½ hours. Turn out carefully and serve hot.

Steamed Date Pudding.

Butter a pudding basin and line it with stoned dates, pressing them well on to sides of basin. Cream 4 oz. butter with 4 oz. sugar until light and white. Sift 6 oz. plain flour with 1 level teaspoon baking powder and a good pinch of salt. Add 1 unbeaten egg to butter, beat well, then add a little of the flour. Add another egg and beat that well in. Add about 1 dozen chopped dates to remaining flour and add to butter mixture. Lastly, add a little milk to form a dough that will drop from the spoon easily. Put mixture into lined basin, cover with buttered paper, and steam for 2 hours. Turn out carefully and serve with sweet sauce.

A. H. TUCKER, Government Printer, Brisbane.