



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

**BEEF PRODUCTION IN NORTH-EASTERN NEW SOUTH WALES.
A REPORT ON A RECONNAISSANCE SURVEY***

by

JOHN H. KELLY

Bureau of Agricultural Economics

and

WYN F. OWEN†

Division of Marketing and Agricultural Economics

I. GENERAL DESCRIPTION OF THE REGION.

Importance of the Region.

Topography and Soils.

Carrying Capacities.

Sub-regions.

2. DESCRIPTION OF THE BEEF CATTLE ENTERPRISE.

Breeding and Fattening.

Combination of Beef and Other Enterprises.

Status of Management.

Scale of Enterprise and Herd Size.

Market Outlets.

Stock Losses.

Pests.

Restrictions on Cattle Movements into Survey Region A.

3. IMPROVEMENT STATUS OF HOLDINGS.

Timber Treatment.

Water Supplies.

Sub-division.

Mineral Deficiencies.

Pasture Improvement.

4. CONCLUSIONS.

* It is desired to acknowledge assistance rendered by Mr. A. Cantrill, Principal Livestock Officer (Sheep and Wool), Division of Animal Industry, in the early field work; to Mr. P. A. Reid, Assistant Director, Bureau of Agricultural Economics; and Mr. P. C. Druce, Principal Economics Research Officer, in the preparation of this report; and to Mr. C. C. Blumer, formerly Chairman of the Board of Tick Control and now Deputy Chief, Division of Animal Industry: and other officers of the Department of Agriculture, for general assistance and comment.

† Mr. Wyn F. Owen, who has since resigned from the Division of Marketing and Agricultural Economics, collaborated in the design of the survey and in the preparation of a preliminary report. The report now published was finalized subsequent to Mr. Owen's resignation from the Division.

This report is the first of a series of regional studies of beef production and potentialities in New South Wales. The area covered by the report is shown on the accompanying map (Figure I). It will be referred to as *Survey Region A*. The region embraces the most specialized beef cattle area in the State. It extends from the Queensland border south to Port Stephens, and embraces the eastern fall of the Great Dividing Range between those points, including the coastal country. The western boundary runs from Wallangarra, east of Tenterfield, through Wollomombi to Hanging Rock and thence along the Mount Royal Range to Barrington Tops; it is defined roughly by the point at which sheep replace cattle as the major enterprise. The region extends approximately 320 miles from north to south, while the east-west measurement varies between 60 and 80 miles.

Dairy cattle constitute a substantial proportion of the total cattle numbers throughout the region. However, most of the dairy cattle are carried on fertile lands in the coastal and near-coastal areas. Limited information has been gained relative to the beef output of dairy farms, but the report is concerned primarily with those holdings on which beef cattle raising and/or fattening is the sole or principal enterprise.

Data included in the report was obtained in the course of reconnaissance inspections of selected holdings and herds, and in general discussions with numerous graziers throughout the region. Particular inspections were made of mineral-deficient areas around Rappville, mountainous areas around Newton Boyd, and basaltic formations in the vicinity of Nowendoc. Other sources of information included officers of the Board of Tick Control, who assisted by providing information of beef-raising properties within the Tick Quarantine Area. Contacts were made with stock inspectors, secretaries, and members of Pastures Protection Boards at Armidale, Casino, Glen Innes, Gloucester, Grafton, Kempsey, Singleton and Tenterfield.

1. GENERAL DESCRIPTION OF THE REGION.

Importance of the Region.

Survey Region A comprises the three complete Premier's Department regions of Richmond-Tweed, Clarence and Oxley,¹ in addition to parts of the Shires of Tenterfield, Severn, Guyra, Dumaresq and Apsley. In March, 1953, it contained approximately 600,000 head of beef stock, or about one-quarter of the beef cattle in New South Wales.

Tables I and II are presented in order to indicate the importance of Survey Region A in the beef industry, relative to both New South Wales and Australia as a whole. It will be noted that, in the early post-war period, there was a marked increase in the number of beef cattle in New South Wales.

¹ The Premier's Department has divided New South Wales into 20 regions for purposes of survey, planning and decentralization. Wherever practicable the regional boundaries coincide with local government boundaries. The regions referred to here are comprised of the following shires:—*Richmond-Tweed Region*, the shires of Kyogle, Tomki, Tintenbar, Tweed, Terania, Woodburn, Byron and Gundurimba; *Clarence Region*, the shires of Harwood, Orara, Copmanhurst, Nymboida, Dorrigo, Bellingen and Nambucca; *Oxley Region*, the shires of Macleay, Hastings, Manning, Gloucester, Wallarobba and Stroud.

In the four years between 1946-47 and 1950-51 the increase was in the vicinity of 40 per cent. for the State as a whole. Since then the beef cattle population has remained fairly static, although in the past two seasons a slight decline in numbers has been evident. Survey Region A was left well behind in the post-war expansion of beef cattle numbers. The greatest expansion took place in the north-western summer rainfall areas, whilst in some other areas, including the south, the increase was also significant.² The exceptional increase in beef cattle numbers in the north-west was due to the combination of rising beef prices in the post-war period, and a long run of favourable seasons; should a prolonged dry spell be experienced in that area, beef cattle numbers can be expected to decline, but cattle have probably become a more permanent feature of mixed crop and livestock farming in the north-west.

TABLE I.

Beef Cattle Numbers as at 31st March, 1952.

Type of Stock.	Australia.		New South Wales.		New South Wales as a percentage of Australia.	Richmond-Tweed, Clarence and Oxley Regions.	
	Number.	Per cent.	Number.	Per cent.		Number.	Per cent.
Cows and heifers over one year...	4,827,000	46.7	1,123,000	47.4	23.3	211,000	44.4
Calves under one year	1,980,000	19.2	579,000	24.4	29.2	94,000	19.8
Bulls	165,000	1.6	45,000	1.9	27.3	7,000	1.5
Bullocks and Steers	3,355,000	32.5	623,000	26.3	18.6	163,000	34.3
Total	10,327,000	100.0	2,370,000	100.0	22.9	475,000	100.0

Source.—Bureau of Statistics and Economics, Sydney.

² In respect of the aggregate figures for the "rest of the State", these further breakdowns are of interest. The region of Mitchell showed an increase in numbers of beef cows and heifers over twelve months between the three years ended, 1946-47 and 1950-51, of 46.8 per cent. In 1950-51 this region contained 40,374 beef cows and heifers over twelve months, representing 3.6 per cent. of the State total. In the same period mentioned, the Southern Tablelands Region (Premier's Department), plus the shires of Monaro, Bibbenluke, Snowy River, Tumbarumba, Holbrook, Tumut, Kyeamba and Gundagai, showed an increase of 43 per cent. These areas, which represent the strongest concentration of beef production in the South, contained 143,962 beef cows and heifers over twelve months, which represented 12.7 per cent. of the State total. The rest of the State, not specifically mentioned above, contained 17.1 per cent. of the State totals for beef cows and heifers over twelve months in 1950-51, and showed an increase of 55.5 per cent. over the three years ended 1946-47.

TABLE II.
*Beef Cows and Heifers over 12 months in Selected Regions
of New South Wales.*

Premier's Department Region.	Average 3 years ended 31st March, 1947.	31st March, 1951.	Number at 31st March, 1951, as a percentage of the average for 3 years ended 31st March, 1947.	31st March, 1953.	Number at 31st March, 1953, as a percentage of the average for 3 years ended 31st March, 1947.
	Number.	Number.	Per cent.	Number.	Per cent.
Richmond-Tweed ...	42,000	58,000	37·1	59,000	39·1
Clarence ...	63,000	74,000	17·8	73,000	15·7
Oxley ...	72,000	84,000	16·5	80,000	11·4
Total ...	177,000	216,000	21·8	212,000	19·5
New England ...	176,000	207,000	17·4	210,000	19·2
Total ...	353,000	423,000	19·6	422,000	19·3
Namoi ...	89,000	164,000	84·9	149,000	68·6
Upper Hunter ...	58,000	90,000	55·5	83,000	44·0
Macquarie ...	49,000	75,000	53·0	74,000	50·9
Total (last 3) ...	196,000	329,000	68·2	306,000	56·9
Rest of State ...	255,000	381,000	49·8	397,000	55·8
Grand Total for State...	804,000	1,133,000	40·9	1,125,000	40·0

Source.—Bureau of Statistics and Economics, Sydney.

Within Survey Region A the increase has been important in the Richmond-Tweed Region, particularly in Kyogle Shire, which contains over half the beef population of that region. There has been a tendency for beef numbers in the more purely dairying shires³ to remain stable. In the more purely beef-producing shires⁴ there was a relatively slight but steadily upward trend of about 16 per cent. in beef cattle numbers between the three-year period ended 1946-47 and the year 1950-51. The greatest increase—about 35 per cent.—for the above period was in the shires with a medium concentration of dairy stock (one to three dairy animals to every beef animal). These shires are Kyogle, Macleay, Hastings, Manning and Wallarobba.

Topography and Soils.

A great part of the region comprises mountainous country, much of it being rugged, steep and difficult of access. Elevations between 2,000 and 4,000 feet are common, whilst peaks rise to above 5,000 feet. Under present conditions of access and land use, probably 20 per cent. of the total area is either unusable or of limited use for grazing. There

³ That is the shires of Terania, Byron, Gundurimba, Tintenbar, Harwood, Tweed, Tomki, Woodburn, Dorrigo, Bellingen, Nambucca and Stroud.

⁴ That is in the shires of Tenterfield, Copmanhurst, Nymboida, Orara and Gloucester.

are considerable areas of dedicated forestry and timber reserves under the control of the Forestry Commission of New South Wales; most of these reserves are let for grazing under year to year occupation permits.

There is great variation in the types and fertility of the soils of the region. Only a small proportion is comprised of highly fertile land. The richest soils are those of volcanic origin, including the plateaux, such as the Dorrigo, together with the alluvial soils on the lower river areas and the fine granites. The richer soil types are devoted primarily to dairying, with beef production on the remainder of the occupied areas. The relationship between beef production and dairying, and the competition for land between beef-raising and dairying are problems which will directly affect the future of beef cattle raising in the region.

Carrying Capacities.

Over the whole of the region the carrying capacity of the beef-raising area varies considerably from about a beast to three acres on the best land (potential dairying country) to a beast to about 50 acres in the inferior grazing country.

In the Tick Quarantine Area⁵ it was found that approximately half of the beef cattle holdings, comprising about half of the land, had a carrying capacity of between four and seven acres to the beast. In the Clarence Region it is estimated that for the open country above the Gorge the carrying capacity varies from three to ten acres to the beast. For the whole of the Grafton Pastures Protection Board district the average carrying capacity of open country used for beef-raising is about seven acres to the beast. As already mentioned, the carrying capacity of scrub and forest country is quite low; for example, it is estimated that the carrying capacity of the heavily timbered forest country around Rappville is between 30 and 50 acres to the beast.

Sub-Regions.

Survey Region A has been divided into three sub-regions, each of which has its own peculiar characteristics, and its special problems. The sub-regions are shown on the accompanying map.

Sub-regions I and II are mainly breeding areas, but the proportion of stock fattened in Sub-region I is greater than in Sub-region II. Sub-region I has been separated from the remainder of the region because of the special problems associated with cattle tick infestation and control. This area is geographically distinct from the Lower Clarence River Valley, and, in a lesser degree, from the purely beef producing areas of New England. Some of the holdings in the northern area of Sub-region II, east of Tenterfield, are used for carrying "growers", brought in as stores from Queensland.

Sub-region III differs markedly from the two northern sub-regions, being primarily a fattening area. It contains a concentration of good fattening country in the Wingham, Gloucester and Dungog districts, which draw store cattle from areas to the north and north-west. The three sub-regions are described in more detail below.

⁵ This area is defined on page 12; it coincides with Sub-region I, as shown on the accompanying map. Movement of cattle into or out of the area is not permitted without due certification. (See page 19.)

Sub-region I. This sub-region, corresponding to the New South Wales Tick Quarantine Area, is bounded on the south by a line running (irregularly) westward from Evans Head through Banyabba to a point slightly west of Lionsville; on the west by a line running north from about Lionsville, through Drake to Lower Acacia Creek; on the north by the Queensland border; and on the east by the coast. It contained approximately 150,000 head of beef cattle in March, 1953.

The soils of the sub-region vary considerably, reflecting differences in geological formations and topography. The soils are derived from a variety of rock types including basalts, shales, slates, sandstones, claystones, mudstones and limestones, with intrusions of granites. The deepest and generally most fertile soils are found either in association with basaltic formations or along the river courses as alluvium, the latter becoming more prevalent towards the coast line. Much of the country is rugged and difficult of access.

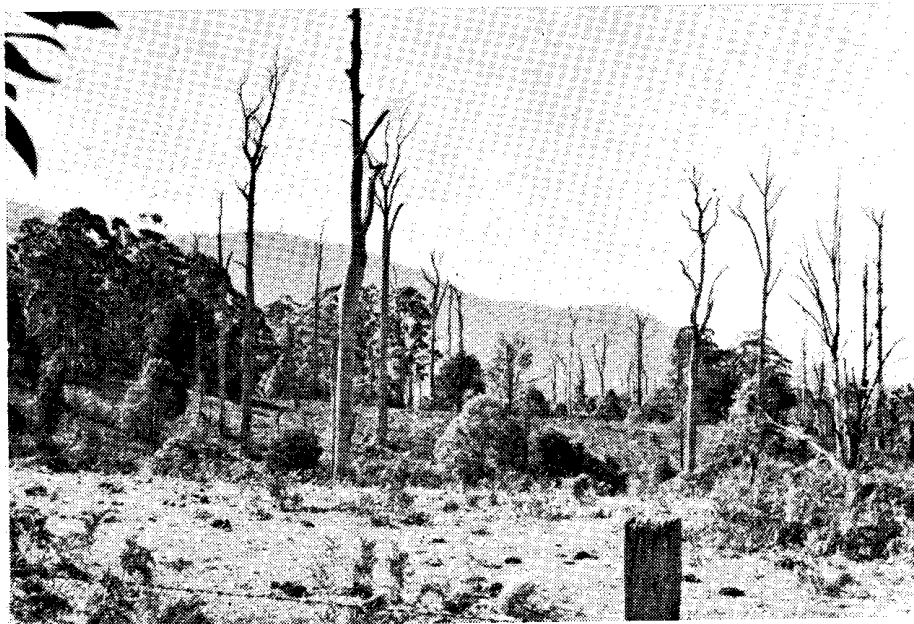
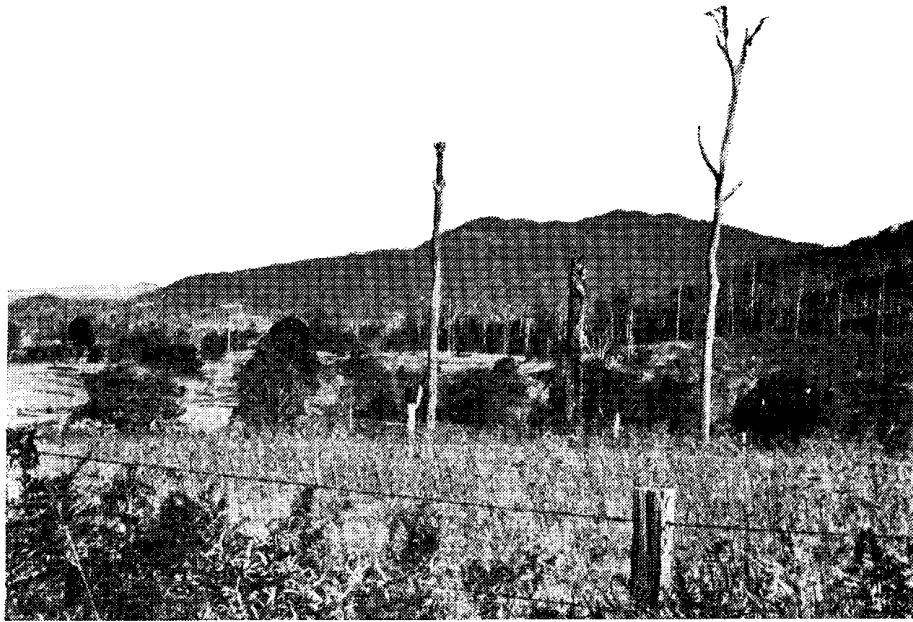
The sub-region is devoted primarily to breeding stores for sale as weaners, steers or bullocks. A large proportion is sold as weaners or yearlings, some—a smaller proportion—are sold as two or three-year-old stores, while a relatively small number of bullocks are held for fattening on some of the pockets of better class country within the sub-region. Cast-for-age breeding cows are normally fattened within the sub-region. Mineral deficiencies constitute a serious problem, particularly in the Rappville area. The Hereford is the predominant breed.

Sub-region II. This sub-region is bounded on the west by a line running (irregularly) in a southern direction from Wallangarra through Wollomombi to a point east of Yarrowitch; on the south by the southern boundary of Macleay Shire; on the east by the coast; and on the north by the southern border of Sub-region I and the Queensland border. The sub-region contained more than 300,000 head of beef cattle in March, 1953, of which about 140,000 were located in the Clarence Region, 42,000 in Macleay Shire, and an estimated 125,000 down the westward margin.

The soils have been derived from shales (predominating), conglomerates, sandstones, slates and granites, with relatively minor areas of basalts. The elevated volcanic plateaux, comprising the Guy Fawkes-Hernani-Dorrigo areas, are of exceptional fertility. There are also rich alluvial river frontage deposits extending some miles from the coast.

The country is, generally, more rugged than that of the other sub-regions, and the low level of winter nutrition presents a greater problem to the cattle industry than in Sub-region I. Mineral deficiency occurs in north-eastern parts, but it is not as serious as in Sub-region I.

Herefords are again the predominant breed, but the influence of the Devon is pronounced throughout the mountainous parts of the sub-region. The proportion of cattle disposed of as weaners and yearlings is appreciably lower than in Sub-region I. Generally, males are sold, as stores, at ages of from two to four years, older cattle being in smaller proportion. A significant number of 2-3-year-old males go to Sub-region III for fattening. Few males are sold as fats, but cast-for-age cows are fattened within the sub-region.



Typical Mountainous Country in Sub-region II, showing Limited Areas of Land Suitable for Pasture Improvement.

Sub-region III. This sub-region includes the rich elevated basaltic plateaux of the Hanging Rock-Niangala-Nowendoc-Yarrowitch areas, which are suitable for intensive development. It is bounded on the north by the southern boundary of Sub-region II; on the east by the coast; on the west and the south by a line running from about Yarrowitch through Niangala to Hanging Rock, thence along the Mount Royal Range to Barrington Tops, and to the coast along the southern boundary of Wallarobba and Stroud Shires. This sub-region comprises the Shires of Stroud, Wallarobba, Gloucester, Manning and Hastings, and the eastern quarter of Apsley Shire. In March, 1953, the area contained approximately 160,000 head of beef cattle.

The soils are derived mainly from shales, slates, claystones, sandstones, limestones, basalts and granite intrusions. The basaltic areas, which comprise the elevated plateaux of the Hanging Rock-Niangala-Nowendoc-Yarrowitch areas, are comparable in fertility to the Guy Fawkes-Hernani-Dorrigo areas of Sub-region II.

The greater part of the area is less rugged than are the other sub-regions. The country is used primarily for the fattening of store cattle, mainly purchased outside the area. Not more than 20 per cent. of the cattle turned off are bred in the area. However, in the northern and western parts, which are more rugged than the remainder, males are bred and sold as stores at about two years of age, mainly for fattening in the southern part of the sub-region. Cast-for-age cows are fattened in the area. The cattle bred within the sub-region are mainly Herefords, but other breeds constitute a significant proportion of the cattle purchased for fattening.

Many of the store cattle purchased for fattening come from Sub-region II, but the supply from that sub-region is sometimes insufficient to meet the demands of fatteners; stores are then purchased from other areas, such as New England and the Upper Hunter. Stores from Queensland are sometimes purchased in the Scone and Singleton sale-yards for fattening in Sub-region III.

2. DESCRIPTION OF THE BEEF CATTLE ENTERPRISE.

Breeding and Fattening.

In Sub-regions I and II the beef enterprise is mainly one of breeding stores for sale as weaners, steers and heifers, together with the fattening of cast-for-age breeders and a few bullocks. In the areas confined to beef cattle raising, the proportion of land suitable (under present knowledge of pasture improvement) for fattening is not high. There are, however, some pockets of rich land within, and on the margin of the beef raising areas; on these lands males are fattened to good weights and prime quality.

Cattle raised in northern areas of Sub-region III are mostly sold as store yearlings to two-year-olds; a considerable proportion goes to the Gloucester and Dungog districts for fattening. Cast-for-age breeders are mostly turned off as fats. In the Wingham district about half the cattle turned off are bred there and half are stores purchased for fattening. In the Gloucester and Dungog areas the enterprise is mainly one of fattening purchased stores. The Gloucester district is one of

the safest and best fattening areas in New South Wales; provided store cattle are available in adequate numbers there is little likelihood of change from the present land use.

Survey Region A plays an important role in turning off young store cattle for fattening in other districts of New South Wales and of Victoria. Store cattle bred on the Tableland country of the region are eagerly sought after and normally command a premium owing to their reputation for doing well and fattening rapidly on good country at lower elevations.

Combination of Beef and Other Enterprises.

In the dairy farming districts, particularly in the marginal areas, there is some combination of beef production with dairy farming, but the overall contribution of the sideline beef producer is small in terms of beef cattle numbers. However, dairy cattle provide a substantial tonnage of beef and veal in the form of surplus females and calves. It is not a usual practice on good dairying country for beef cattle to be run in association with dairy cattle, but, scattered throughout the good dairying country there are some holdings used for beef production.

Along the western margin of the region some sheep—mainly merino wethers—are run on cattle properties. The limiting factors to the more easterly extension of sheep into the cattle country are dingoes, increasing rainfall and topography. However, sheep are not of major importance within the region, the western limit of which was defined as the point where sheep become the dominant enterprise.

Status of Management.

Since the war cattle and beef prices have in general been regarded as satisfactory, and the beef industry within the region is now in a reasonably sound financial condition. However, this does not hold for a proportion of properties where production is marginal, either because of an inadequate scale of operations, or because they are located on "problem" country.

The general outlook is one of confidence for the future, and there has been an appreciable improvement in the overall standard of management during recent years. On the other hand, substantial investment is necessary in many areas before natural pastures can be utilized really efficiently, quite apart from possibilities of pasture improvement.

Standards of Beef Herds. The Hereford is, generally, the predominant beef breed in Survey Region A, but in the inferior mountainous country, the Devon, with an infusion of Durham, or Devon-Durham cross, is favoured. The breeding herds are mostly of good standard, some being of high class. A few of the herds are of nondescript type, but these are only a small minority, and are concentrated in certain areas such as around Rappville.

The quality of beef cattle in the region has improved over recent years, an important factor being the introduction of better quality bulls on the smaller holdings. Favourable beef prices have also been influential in raising levels of quality.

Scale of Enterprise and Herd Size.

Some indication of the distribution of different sizes of beef herds in Survey Region A is given in Table III, which is based on figures collected by the State Statistician as at 31st March, 1950; later figures are not available.

It will be noted that nearly 56 per cent. of holdings reporting beef cattle had herds of under 50 head. In the main these represent the side-line beef enterprise on dairying properties. The other most notable feature is that only eight per cent. of holdings reporting beef cattle ran more than 300 head, but these properties carried 51 per cent. of the total beef cattle.

TABLE III.

Size of Beef Herds—North Coast Division 31st March, 1950.

Size of Herd.	Percentage of Herds in Group.	Percentage of Total Beef Numbers in Group.	Size of Herd.	Percentage of Herds in Group.	Percentage of Total Beef Numbers in Group.
	Per cent.	Per cent.		Per cent.	Per cent.
Under 20 ...	33.9	2.2	150-199 ...	5.5	8.6
20- 49 ...	21.8	6.4	200-299 ...	5.7	12.2
50- 99 ...	17.5	11.2	300-499 ...	4.2	14.6
100-149 ...	7.6	8.2	Over 500 ...	3.8	36.5

Source.—Bureau of Statistics and Economics, Sydney.

A further indication of the distribution of herd size on properties running more than 50 head is given from the figures shown in Table IV for the Grafton Pastures Protection Board for 1950.

TABLE IV.

Size of Beef Herds—1950. Grafton Pastures Protection District.

Size of Herd.	Percentage of Herds in Group.	Size of Herd.	Percentage of Herds in Group.
	Per cent.		Per cent.
50- 99 ...	15	500- 999 ...	7.6
100-299 ...	56	1,000-1,999 ...	2.8
300-499 ...	17	Over 2,000... ...	1.6

A similar picture was obtained from data collected for the Tick Quarantine Area (Sub-region I) for 1952. This showed that 53 per cent. of holdings ran between 100 and 300 cattle. These figures confirm the impression gained during the survey that the majority of one-man-unit specialist beef holdings carry between 100 and 250 head.

Market Outlets.

Market outlets are adequate for all the cattle raised and/or fattened in Survey Region A at present, or for any likely expansion of the industry there. The region is well served by meatworks and local abattoirs for the slaughtering of cattle. Meatworks in or adjacent to the region are established at Wallangarra, Tenterfield, Aberdeen, Casino, Grafton and Macksville. The meatworks at Casino, Grafton and Macksville are farmer-grazier controlled co-operatives. There are regular saleyard markets for both fat and store cattle. Principal store cattle saleyards serving the region are located at Tabulam, Casino, Grafton, Gloucester, Tenterfield, Glen Innes, Armidale, Tamworth, Scone, Singleton and Maitland.

Access to market points is difficult, in parts, owing to the rugged nature of the country and the relatively few road outlets. The use of motor transport for the movement of cattle is widespread, but is limited by some of the mountain roads which are steep, tortuous and narrow, rendering motor transport, in these parts, very difficult, particularly in wet weather.⁶

Although this limitation in the more rugged areas is likely to be a permanent one, the problems of stock movement throughout Survey Region A are not of major importance in assessing the scope for increased beef output. However, difficulty of access in the rich basaltic areas of the Nowendoc-Yarrowitch part of Sub-region III is an important factor limiting further development.

The natural outlet of the Nowendoc area is in the direction of Wingham, Taree and Gloucester, and of the Yarrowitch area to Port Macquarie, but this is at present largely denied by inadequate road access.

Stock Losses.

Heavy losses from Blackleg were experienced in 1951. This disease is still the cause of some mortality, but it is becoming less serious as the use of precautionary inoculation becomes progressively more general. Worm infestation is common on the lower lands and more generally in wet seasons. In drought periods the incidence is also higher, as more cattle are forced down on to the low country. Control of worms by means of drenching and rotational grazing is generally inadequate. In areas of serious mineral deficiency, and so-called "coast" disease, there is some infertility amongst breeders which is reflected in a much lower percentage of calf drop than in sound country.

Major losses are occasioned by periodical drought or by the effects of unreliable spring rainfall. Variability in seasonal rainfall and the inevitable loss of condition caused by winter starvation are reasons why much of the country carries a large proportion of "growers", particularly as males withstand adverse pasture conditions better than breeders. Such unreliable seasonal conditions limit the possibility of

⁶ Because of the rugged nature of the country the use of motor vehicles is restricted on many holdings; consequently it is necessary for much of the cattle work to be done "on camp", and the pack horse is still necessary for transporting the stockman's camping and cattle-branding gear.

a desirable change in organization toward a greater proportion of breeders and turn-off at an earlier age. In the higher country, where winter temperatures are low and pastures are lacking in nutritional value, the problem of loss of breeders and a low percentage of calf survival is most acute.

Pests.

Rabbits. Rabbit infestation is a major problem. Myxomatosis has reduced rabbit numbers in recent years but the problem remains serious, and it is obvious that control of the rabbit is a first necessity for any expansion in beef production. It is also a prerequisite to any pasture improvement programme on individual holdings. Some graziers have shown that by consistent trapping and poisoning, together with destruction of burrows, rabbits can be controlled effectively even without the aid of wire netting.

Dingoes. Dingoes are prevalent in the heavily timbered mountainous areas of the region, and they cause some calf losses; it has not been possible to ascertain the actual extent of these losses. Control measures are not active; but in normal seasons, at least, the dingo does not constitute a serious problem to the cattle industry. It is apparent, however, that the eastern limit to sheep production is in large part defined by the threat of the dingo. There are sizeable areas within the region where sheep could be run economically but for the presence of dingoes.

Cattle Tick. At present, cattle ticks are contained within Sub-region I. At one time ticks penetrated as far south as Macksville. However, a campaign many years ago resulted in the eradication of the pest from points south and west of the present quarantine areas.

The area within the boundaries of cattle tick control comprises about 4,500 square miles. The area is protected by a fenced boundary, which is patrolled continuously to prevent the movement of cattle into or out of the area without due certification. Gates are established on the fence at all points where roads and stock routes cross the barrier; these gates are manned continuously.

Within the present control area there are about 1,200 cattle dips under the supervision of a tick control organization. This organization consists of a Board of Control, the chairman of which is a senior veterinary officer of the Division of Animal Industry of the New South Wales Department of Agriculture. The Board has six stockowner members, three of whom are elected and three appointed. The Board's administration consists of a senior inspector, sectional inspectors, senior assistants and field assistants. The number of personnel engaged on tick control work is about 500.

Tick control measures are applied as follows:—

- (a) *Infested holdings.* On infested holdings cattle must be dipped four times at 14-day intervals. If the beasts are still infested the same dipping process is repeated.

(b) *Non-infested holdings.*

- (i) East of the Richmond Range, cattle (other than milking cows) must be dipped nine times at monthly intervals between October and the end of June. Milking cows are examined at similar intervals by tick control officers.
- (ii) West of the Richmond Range, the same measures as in (i) are followed except that periodical dippings number five instead of nine.

The degree of infestation west of the Richmond Range is much lighter than it is east of the Range.

Mustering and dipping of cattle is closely supervised by officers of the Board, and detailed records of all cattle are made at each dipping. The liquid content of dips is analysed at least once a month to assure the correct strength of the mixture. Cattle moving out of the Tick Control Area must be certified as having received three special clean dip treatments (in addition to normal dippings) at not less than five nor more than ten days between treatments before movement out. Individual tick control assistants have from seven or eight up to twenty herds (according to herd size and location) under their supervision.

Existing control measures are essential, particularly in view of the threat to the dairying industry. However, the associated restrictions on the movement of cattle constitute an obstacle to the full development of the area as a source of store cattle supply to fattening areas. On technical grounds there is agreement that complete eradication could be achieved within a reasonable period if necessary resources were applied in an eradication campaign. The following points emphasize the need for the introduction of a vigorous tick eradication programme:

- (a) The high annual cost (approximately £500,000) of containment of the pest within the existing tick quarantine boundaries.
- (b) The possibility of the pest spreading into adjoining areas.
- (c) The inhibiting effect of the quarantine requirements on the full exploitation of the beef breeding and dairying potential of the area.

Restrictions on Cattle Movements into Survey Region A.

A regulation, designed to prevent the introduction of tick fever, prohibits the entry of cattle from Queensland into the Tick Quarantine Area. The greater part of Survey Region A comprises a pleuro-pneumonia protected area. For some years no cattle have been allowed to enter the Pastures Protection Board districts of Tweed-Lismore, Casino, Grafton and Port Macquarie, except under special permit. Permits are granted only where it can be established that the cattle concerned have not been in contact with pleuro-pneumonia; in effect, this regulation prevents any cattle from Queensland sources entering the above districts.

In 1953 the pleuro-pneumonia protected area in the north was extended to include sections of the Glen Innes and Armidale Pastures Protection Board districts, bringing the western boundary of the protected area in this vicinity close to that of Survey Region A. It is

difficult to judge the extent to which the above restrictions on stock movement affect the beef industry within the region, but it is unlikely that the effect is important.

It is to be expected that with the recent western extension of the boundary an important source of cattle to the Grafton Protection Board's district will now be included within the overall pleuro-pneumonia protected area.

3. IMPROVEMENT STATUS OF HOLDINGS.

The beef cattle industry within Survey Region A is based on natural pastures. Very few holdings are equipped for pasture improvement work, and there is virtually no supplementary feeding of beef stock. Before discussing the possibilities of pasture improvement, some comments on the existing state of improvements, and the potential for development on the basis of natural pastures alone, are appropriate.

Timber Treatment.

The scope for improvement of natural pastures through timber treatment is limited. Most of the country on which timber could be safely treated without risk of further erosion has already been treated and re-growth controlled.

Much of the remaining country considered suitable for treatment is heavily timbered, and treatment was not considered to be economical even when costs were much lower than they are at present. It would certainly now be generally uneconomic by manual methods, but modern techniques of mechanical clearing may make it an economic proposition, in the volcanic areas, where the land has a high potential for pasture development. However, it is apparent that high costs of treatment will limit the area of country on which timber can be economically treated. There are some areas which are now either sufficiently cleared or requiring little further treatment for pasture development, and only these are taken into account when considering the scope for pasture development within a reasonable period.

Water Supplies.

There are numerous perennial streams which serve most of the stock watering needs of the lower country as at present sub-divided. If this lower country is to be closely sub-divided, additional water points (sub-artesian bores, wells or dams) will have to be created. The critical problem of water supply, however, lies in the insufficiency of water points in the higher country. It frequently happens that when spring rains fail and feed becomes scarce, good dry feed in the high country has to be abandoned because there is no water. Under these conditions, over-grazing of the lower country is inevitable. Such conditions prevailed in the summers of 1951-52 and 1953-54 when there were losses of beef cattle, particularly breeders and calves.

In the past the excavation of suitable catchments in the high country by horse-operated implements was difficult. With the ready availability of bulldozers and tractors, and more efficient earth moving equipment, this difficulty can now be overcome, making economically possible the location of strategically placed water points where they are urgently needed in high country.

Sub-Division.

Most of the medium to small beef holdings are reasonably sub-divided. On some larger holdings, however, and in areas subject to worm infestation and mineral deficiency, more sub-divisional fencing is needed to ensure controlled rotational grazing.

In general, existing sub-divisions are designed to fit in with natural water supplies. Necessary sub-division is, however, closely associated with water supply. On many holdings there is a need for fences to hold cattle on high country as required.

Mineral Deficiencies.

In the Rappville area, on the coastal country below Grafton, and in the mountainous country on the western side of the region, mineral-deficient pastures are common. It is likely that the problem goes beyond a mere shortage of lime and phosphate. Should these areas be found to be deficient in other mineral elements, correction may prove influential in relation to cattle raising. The particular problem of mineral deficiency is best viewed independently from the more general problem of animal nutrition in other parts of the region.

Where the problem of mineral deficiency exists there is scope for correction through the integration of deficient areas with better types of country. In this relation a pattern of management was developed by a station in the Rappville district. This station carried approximately 1,400 breeders and reared their progeny, generally to one year old. The carrying capacity of the station's secured country is about one beast to fifteen acres. Mineral deficiency is, in some degree, counteracted by liberal supplies of bone-meal and ground limestone, and by the frequent moving of cattle from paddock to paddock. For the main part, however, the problem was met by operating this Rappville station in conjunction with good fattening country in the Willow Tree district. The standard practice was to move yearling heifers and males from one to two years old to the Willow Tree country. The males were fattened for marketing and the females were held on the Willow Tree country until in calf, at about two and a half years old, when they were returned to the Rappville country. Here they continued to breed until they were cast for age (at about eight years old), speyed, and returned in forward condition to the Willow Tree country for fattening. By this process of being moved as yearlings to a holding on sound country for about eighteen months, plus access to liberal quantities of bone-meal and ground limestone during their breeding life, the females were fitted to overcome, to a considerable extent, the mineral deficiencies in the Rappville area.

The practice of moving heifer weaners to Willow Tree and returning them in calf to Rappville was discontinued in 1953, partly because of labour difficulties in moving the cattle, and partly to determine whether the pattern otherwise followed was satisfactory. It will take some years to test the relative efficacy of the altered practice.



Carpet Grass typical of Mineral Deficient Areas in Sub-Region I.

Pasture Improvement.

In general, the land in Survey Region A is stocked to the capacity of the natural pastures. The nutritional value of these pastures declines progressively from early winter into the spring, when the combination of rising temperatures and spring rainfall makes for recovery. Under these conditions there is a serious annual loss in the body weight of cattle, particularly breeders and weaners.

If the winter is unusually severe there is, inevitably, mortality amongst breeders; if the spring recovery is delayed by dry conditions there are losses of calves and of cows during calving. In these conditions graziers carry a proportion of "growers", which are better able to withstand adverse conditions than breeding cows. The smaller proportion of breeders, in areas where the nutritional level of natural pastures is low, naturally depresses the percentage turn-off from the property below that which could be attained if all cattle except female replacements were turned off as weaners, and if the limitation to the proportion of breeders imposed by winter starvation were removed.

Although there is considerable interest amongst graziers concerning the possibilities of pasture improvement within the region, very little work in the purely beef cattle areas has been carried out to date. A further complexity in the general situation is that those sections of the beef cattle areas which appear to offer the best prospects for pasture improvement are towards the eastern and western boundaries, and are marginal for dairying and fat lamb production respectively. Pasture development in these districts may well lead to a change-over to a more intensive form of land use rather than an expansion of beef production. However, it is unlikely that beef raising will become a complementary enterprise with dairying in other than the marginal dairying areas.

An example of what has been done on this type of country was noted in respect of an area of 200 acres of rich flat in the Mallanganee district. This area has been sub-divided into about thirteen paddocks, and limed at the rate of one ton to the acre. Under a rotational grazing system the area was stated to have an annual capacity for topping off three head of forward store bullocks to two acres. This is a rare example, and the owner concerned recognised that the land would be more appropriately used for dairying.

In the volcanic country around Nowendoc, small areas of improved pastures comprising phalaris, cocksfoot, rye and white clover have been established on beef cattle holdings. However, this venture has been rather haphazard, and according to one grazier in the district economic results were doubtful in respect of beef production alone. Nevertheless, the volcanic country is responsive to pasture improvement by renovation and top dressing, and, if need be, by reseeding with such species as those mentioned. The same is true of large areas in the Gloucester district, where paspalum, kikuyu and blue grasses, trefoil and white clover comprise much of the unimproved pastures.



A Striking Contrast between Typical Breeding Country in Sub-Region II and High Class Fattening Country in Sub-Region III.

East of Tenterfield, on fine granite country, promising results are being obtained with lucerne and rye grasses. On a particular property investigated improved pastures (established at a cost of about £8 an acre) were used to support a dairying sideline; the owner did not consider that it would be an economic proposition to establish such pastures for beef production alone.

The existing position as disclosed by this reconnaissance survey is that pasture improvement has not yet been widely or systematically attempted in the beef cattle areas of the region. However, the following factors are relevant to a discussion of the problem of improved animal nutrition through pasture improvement:—

- (i) Carrying capacity and beef production are limited by the low level of winter nutrition which would be overcome by successful pasture improvement.
- (ii) Rainfall throughout the area is not unfavourable for pasture improvement.
- (iii) Although much of the region is mountainous, there are considerable areas already sufficiently cleared where the terrain would permit the use of pasture improvement implements.
- (iv) Recognised techniques of pasture establishment have not yet been systematically tested over various soil-types on country of suitable terrain. If these techniques were correctly employed, the economic establishment of improved pastures on some soil types may prove to be possible. Recent developments in pasture research, including improved strains of pasture species and legume nodule bacteria, together with the use of trace elements, suggest that methods will, in future, be developed which will enable successful pasture establishment over a much wider range of soil types.
- (v) As in other areas, the economics of pasture development will be determined by costs of establishment and maintenance, and the production response obtained. There is no apparent evidence to show that costs will necessarily be higher, or response lower, than in other areas where the practice has proved profitable.



Choice Spray-Irrigated Fattening Country in the Gloucester District.

This discussion leads to a reasonable conclusion that there is a potential for increased beef production through pasture improvement in Survey Region A. This is contingent on the successful employment of techniques of improved pasture establishment. It cannot be expected that progress in development of the potential will be rapid until a vigorous field research programme is inaugurated. If this is done, and an economic solution of the problem of winter nutrition on beef cattle properties is found, it will lead to an important increase in beef cattle production in the region.

4. CONCLUSIONS.

Survey Region A at present carries approximately 600,000 head of beef cattle, or about 25 per cent. of the beef cattle of the State. Apart from a relatively minor setback in the mid-forties, due to drought, cattle numbers in the region have shown a steady increase during the past decade. During the six years ended 31st March, 1953, beef cattle numbers in the region increased by approximately 19 per cent. This increase, while substantial, was considerably below that for the State as a whole.

The region plays an important role in the New South Wales beef cattle industry in producing young store cattle for fattening in other areas, although an increasing proportion of turn-off is fattened within the region. There is scope for a considerable increase in beef cattle production, but this cannot be achieved easily, and depends on the solution of a number of problems at present limiting expansion.

A brief discussion of the major limiting factors requiring attention follows:—

- (1) *Nutrition.*—The low nutritional level of winter pastures over the greater part of the region, and serious mineral deficiencies in some of the northern areas, combine to cause a heavy loss of condition of cattle in winter and early spring, a low percentage of calving and calf survival, and, in the case of acute mineral deficiency, to produce cattle of diminutive stature and inferior quality. The raising of the nutritional level of winter pastures and the correction of mineral deficiencies is essential to prevent this loss.

In the non-volcanic formations, which predominate in the region, there are extensive areas where phosphate and calcium are known to be deficient. The seriousness of mineral deficiencies, which go beyond phosphate and calcium, is considered to have a marked influence on the beef production potential. If these deficiencies were corrected, the result would be heavier carrying capacity, higher percentage of calving and calf survival, and a more robust constitution of cattle.

Although some limited progress has been made in overcoming these nutritional problems, a concerted programme of research is a prerequisite to any general solution. Aspects particularly demanding attention include techniques of pasture establishment and maintenance, and possibly fodder cropping, problems of mineral deficiency, and the reactions of particular breeds of cattle to the environment, with particular regard to daily weight gain.

-
- (2) *Rabbits*.—Despite the destruction of rabbits caused by the introduction of myxomatosis, there is still need for concerted efforts by landholders with the object of permanent eradication. This report indicates that effective and economic control measures have been well established by some graziers, even without the use of wire netting.
 - (3) *Cattle Tick*.—The prevalence of cattle ticks in Sub-region I remains as a serious problem for both beef and dairy production in the infested areas. Existing control measures are costly, and there is always the possibility of the tick developing immunity to arsenical dipping mixtures, which would render control more difficult and even more costly. Vigorous measures for complete eradication appear to be warranted.
 - (4) *Improvements*.—The need is urgent for more water points in those parts of the region where there are no permanent natural supplies; this applies particularly in high country. Creation of more water points should be designed to fit into plans for closer subdivision of holdings. Further ahead, improvement of animal nutrition depends on improved pastures and correction of mineral deficiencies. This, in turn, will create a need for smaller paddocks, involving substantial additions to existing fencing.

It is quite impracticable to make any firm assessment of the potential for increased beef production from the region. However, a reasonable judgment would be that overall beef cattle production could be increased by the order of from 20 to 30 per cent. if the problems of winter starvation and mineral deficiencies can be solved.