THE SPROWSTON FARM

A Report for Members of the Norfolk Agricultural Station

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THE FARMING

Yields 1957. At this time of the year it is impossible to give the yields of all the 1957 crops. Vining peas have, of course, been harvested, the average yield from 60 acres being 37½ cwt. per acre. Two crops were of particular interest; one of autumn sown Perfection which yielded much less than spring sown crops of the same variety. Comparisons between adjoining fields are notoriously unreliable but the difference was so great and the survival of the autumn sown Perfection so good that the experience is of more than passing interest.

Similarly two fields of the same variety yielding almost exactly the same but delivered at different tenderometer readings gave a financial return much in favour of the crop harvested at the low reading.

Cereal yields seem to be satisfactory; one field of Cappelle winter wheat grown after vining peas which looked the best crop of wheat on the farm at harvest yielded 20 sacks per acre.

The new white winter oat Powys threshed out at 28½ sacks per acre and stood very well. It was sown after potatoes; details of the manuring is given on page 18 of the 1957 Farm Guide.

Potatoes, 1956 and 1957. The prospects of the 1956 crop seemed to foreshadow a very good crop, but the poor trade in April and May, loss in weight through sprouting in the hale and a rather inferior sample in the end, resulted in an unsatisfactory financial return, despite a fair yield of 9¾ ton of King Edwards per acre.

This year the sample is much better and the yield likely to be higher than in 1956. The position in July and August, however, looked ominous for severe symptoms of blight were observed and the spread of the disease was unusually rapid. We sprayed with copper compounds four times at intervals and burnt the haulm off with acid spray in September.

The value of the early protective spraying was very obvious compared with areas deliberately left unsprayed for the assessment of blight resistance of some new varieties under trial. All the foliage had disappeared from the susceptible varieties before the end of August and the contrast with the sprayed crops and one resistant variety was truly remarkable.

We have used a complete potato harvester to harvest the last two crops. Good weather and complete destruction of the haulm

are necessary for a peaceful time with a potato harvester. Thus the timing of the acid spray to destroy the haulm and the efficiency of the spraying are both important.

The time of acid spraying is not always easy to determine, for too early spraying reduces the yield by preventing further growth, yet the same will result from allowing the disease to run riot, and the tubers will be infected. With most varieties, especially King Edwards and its allied varieties, the risk of blighted tubers is not worth taking. King Edwards must usually be burnt off first and the haulm given time to disintegrate : thus we are burning off at Sprowston while there is still some growth in the crop.

It is not easy to forecast how successful and especially how expeditious the haulm destruction will be : it should be quite quick, but the haulm sometimes proves tougher than usual and delays the start of lifting with elevator diggers and harvesters with similar lifting mechanism. We have 60 acres of potatoes and 65 acres of sugar beet to lift, so we must start potato lifting in mid September; at a time in fact when a blight-free crop would be rapidly bulking. We are forced, however, to get on with the job, and no doubt in some years lose yield by doing so.

Sugar beet virus yellows. Not everyone heeded the warning given by several authorities that a severe attack of virus yellows was likely this year, remembering perhaps that similar forecasts in the past have not always proved true. Much of course can happen to over-wintering aphids before the beet crop is available for their attacks. But this year they came through in full force and the result is well known; much of the beet in Norfolk is very yellow and there are reports of low yields and low sugar contents. We sprayed all the beet once, and some fields twice, and although this did not prevent virus yellows appearing the spread was undoubtedly checked and the crops may yield around 15 tons washed beet per acre. Sugar contents were 16-16.5% in October and about 17% in November.

It seems that we must spray as soon as green aphids are seen They cause the initial damage, and are easily and not very expensively controlled.

The spray is likely to protect them for three weeks or so by which time the situation should be in hand, and a re-assessment of a comparatively undamaged crop can then be made. It is just one more instance of locking the stable door in time, for this year the low yields and low sugar contents are largely the result of not spraying or not spraying in time.

Cattle. The beef production at the Station is now self-contained; we rear all we fatten. The Friesians and Angus Friesians came into the yard on the 1st November; later than usual for there was plenty

of autumn grass. Their weights at about 12 months old were as follows :—

Friesian steers	5½ cwt.
Angus × Friesian heifers	5½ cwt.
Angus Friesian steers ...	4¾ cwt.

All these cattle have not been kept under comparable conditions, the heifers being in a separate field. The steers were run together and the daily live weight gains on the grass of the Friesian steers was 1.05 lb. and if they are to reach a live weight of 9 cwt. it will take until 1st June next to finish them and they must average 2¼ lb. live weight increase daily, which is of course possible but will be rather an achievement if it is attained.

THE EFFECT OF HORMONE IMPLANTATION ON THE LIVE WEIGHT GAIN AND CARCASE CONFORMATION OF FATTENING CATTLE

It has long been known that implantation of female hormone in male poultry prevents the full development of the male characteristics and brings about changes in growth and fleshing, particularly in increased deposition of internal fat. More recently work in America and this country has shown that implanting cattle and sheep with female hormone increases growth and live weight gain and produces a leaner, meatier animal. The findings in respect of cattle may be summarised as follows :—

1. Implantation has no benefit for young animals but if done about 100 days before marketing 25-50 per cent. better live weight gain has been recorded during this period. The increased weight mainly takes the form of bone and muscle rather than fat.
2. The undesirable side effects of hormone, i.e., raised tail head, increased teat development and sexual restlessness which have been found at high dosage rates are not shown if the dose is limited to 60 mg hexoestrol.

In the autumn of 1957, forty Friesian yearling steers were fattened in two yards, twenty cattle to each yard. On 24th January the cattle were divided into four groups of ten beasts, as evenly matched for live weight as possible. One group was implanted with 36 mg stilboestrol and these bullocks were afterwards run with ten untreated cattle in one yard: the second yard was allotted to a similar group implanted with 48 mg stilboestrol and the corresponding untreated cattle. The pellets of hormone were implanted in the ear using a normal poultry implanter.

After treatment all the cattle were weighed on 21st February and 21st March: thereafter the cattle were weighed at disposal. The

cattle were marketed through the F.M.C., with whom arrangements had been made by the School of Agriculture, Cambridge, to record carcase measurements and conformation. No attempt was made to market the same number of beasts from each group when a batch was drafted, but each animal was sold when considered fit to grade. The most forward cattle were sold on 20th March and the last left the farm on 24th May.

There was little difference between the two dosage rates of hormone and the most reliable guide to the effect of implantation is therefore based on the comparison between the average live weight gain of all the implanted cattle from the date of treatment to disposal with that of the corresponding untreated animals. From 24th January to the date of disposal the average live weight gain of the treated cattle was 2·43 lb. per day as compared with 1·89 lb. for the untreated. This represents an extra gain of 0·54 lb. per day, or a 28 per cent. improvement in live weight increase, which is in line with the other results to which reference has been made.

Although the improved live weight gain of the treated animals after implantation was well marked, the mean live weight increase over the whole yarding period from 30th October to disposal only showed a difference of 0·16 lb. per day in favour of the implanted cattle. The explanation is that the cattle later allocated as "controls" made better live weight gains during the period before implantation, a purely fortuitous difference in performance since the cattle were allocated to treatments on the basis of their December weight to give uniform groups and at the date of implantation the groups were in fact virtually uniform.

It is felt, however, that this discrepancy between the earlier growth performance does not invalidate the undoubtedly better live weight gain after implantation.

Carcase conformation. Carcase measurements were recorded by the staff of the School of Agriculture and their help is gratefully acknowledged. The carcases were graded for (1) Finish, (2) Internal fat, (3) Cod fat, (4) Kidney suet, (5) Loin, (6) Topside, using a scoring scale of 1-10 points in which a score of 6 is equivalent to that shown by a good Argentine fore or hind-quarter.

The general trend was that the implanted animals had less fat on their carcases than the controls, but much the same meat:—loin and topside. The pelvic channels also seemed wider in the treated animals, but there was no noticeably raised tail head, a finding which confirmed the observations made on the animals when in the yards.

The absence of these abnormal characteristics supports the general experience that they are only in evidence when excessively high doses of hormone are given.

Grading. The Ministry gradings are shown in the accompanying table.

	A	B	C
48 mg implant .	–	7	3
Control . .	5	4	1
36 mg implant .	3	5	2
Control . .	2	6	2

The bullocks which received 36 mg of hormone graded equally as well as the corresponding controls: the grading of the cattle at the higher rate of dosage was not so good, but with comparatively small numbers of animals in the groups it is doubtful whether this difference is really a significant one.

CEREAL TRIALS 1957.

Winter Wheat: Time of drilling, seedrate and top-dressing trial. A new trial with Cappelle winter wheat was started in 1957 to replace the earlier series on time of top-dressing and drilling. The new investigation was designed to compare very early drilling (about the third week in September) with normal drilling roughly a month later. In addition three seedrates, 1½, 2½ and 3½ bushels per acre, the presence and absence of seedbed nitrogen and spring top-dressings of 2 or 4 cwt. per acre of nitro-chalk were compared. The effect of seedrate was very similar to that observed in previous trials, namely, that seedrates in excess of 2½ bushels per acre tended to depress yields but that the low seedrate gave the same yield as the middle seedrate. The trial followed a crop of vining peas; mustard had been sown to cover the land following the pea harvest to prevent wheat bulb fly attack and the mustard was ploughed in green before the wheat. This supplied some readily available plant food so that the response to 1 cwt. per acre of nitro-chalk on the seedbed was small, about half a sack of grain per acre. The seedbed nitrogen produced a slightly greater response in the later drilled wheat.

The spring treatments consisted of 2 cwt. per acre of nitro-chalk applied to all plots in March with half the plots receiving the same dressing again in April. The additional 2 cwt. of nitrogenous fertiliser added 3 more sacks of grain to the 18½ sacks per acre obtained from the single top-dressing.

This trial has been modified for the 1958 season so that more information can be obtained about the response to seedbed nitrogen. The rates will be nil, 1 and 2 cwt. per acre nitro-chalk on the seedbed, top-dressings will remain as before and the high seedrate (3½ bushels per acre) will not be included.

Winter Wheat: Manuring and time of application trial. This trial, also with Cappelle, compared all combinations of no fertiliser, 1½ cwt. sulphate of ammonia, 3 cwt. superphosphate and 1½ cwt. muriate of potash per acre applied either to the seedbed or as a very early top-dressing in the spring. In order to avoid obscuring the effects of these experimental dressings, no later nitrogenous top-dressing was applied. This was the second year of the investigation and the results were similar to those obtained in 1956. The dressing of nitrogen produced 3 sacks of grain more than the control, whether it was applied in the autumn or the spring. In autumn phosphate and potash had no effect, but in spring the phosphate gave 1 sack and the potash 2 sacks of grain more than the controls. Samples of grain from the 1957 harvest are to be grown on by the Plant Breeding Institute in Cambridge to find out whether the unbalanced manuring has any effect on the subsequent performance of Cappelle Desprez wheat.

Barley: Variety and nitrogen trial. Since the introduction of Proctor, farmers have been looking to the plant breeder for barleys of comparable quality and yield but maturing at a different time in order to spread the harvest. A year or two ago Provost and Maythorpe were just on the market and showed promise of fulfilling these requirements: an investigation was therefore begun at Sprowston in 1956 to find out the levels of nitrogen and rates of seeding most suitable for these three varieties.

In the first year following beet the response to 1½ cwt. per acre of nitro-chalk amounted to 2·3 sacks per acre of grain as compared with the plots receiving no nitrogen, but a further 1½ cwt. per acre of nitro-chalk gave only an additional 0·6 sacks per acre. In the second year, again after beet, the response to the lower dressing was very similar, namely, 2·5 sacks per acre, and the extra nitrogen on the high rate produced another 1·2 sacks per acre. These results confirm our previous experience that even under the comparatively high fertility conditions following sugar beet at least 2 cwt. per acre of sulphate of ammonia or its equivalent is justified for modern barley varieties at Sprowston. Variations in seedrate only gave significant yield differences in 1957, when the highest rate of 3 bushels per acre gave a sack more grain per acre than the two lower rates. In the first year the results showed a similar trend, but the difference in favour of the high seedrate was only half a sack of grain, which could not be regarded as a significant gain.

The relative performance of the three varieties was very different in the two years, although on both occasions Proctor outyielded Provost, by 2 sacks per acre in 1956 and 1½ sacks per acre the following year. In 1957 Maythorpe, although only slightly lodged, was the lowest yielder of the three, producing a sack per acre less than Provost, but in the previous year when it was very badly laid Maythorpe outyielded both the other varieties and proved better than Proctor by no less than 1 sack per acre. This is rather a surprising

result and it may be that the early maturing Maythorpe was in some way specially favoured by the season in 1956. In both years the grain quality of Proctor was the best, and that of Maythorpe the worst. The best samples were grown in the absence of nitrogenous fertiliser and increasing doses of nitrogen resulted in a progressive worsening of the quality in all three varieties.

Barley: Rates of nitrogen and method of application trial. The object of another barley trial carried out for the first time this year was to ascertain the effects on Proctor barley of nitrogen applied at three different times: on the seedbed, and as top-dressings in mid-April or mid-May. In addition to control plots receiving no nitrogen the treatments were based on three levels of manuring, namely, 2, 4 and 6 cwt. per acre of nitro-chalk. These dressings were applied either all on the seedbed, all as an early or late top-dressing or as divided applications on any two or all three of these occasions. This obviously gives a wide range of possible methods of giving nitrogen to the barley crop, some of which may appear not very practical at first sight: in a modern field experiment, however, the inclusion of such treatments is sometimes necessary to satisfy the requirements of the experimental design. After a white straw crop the level of fertility was clearly very low, since the yield from the control plots was only 8·9 sacks per acre. Under these conditions the response to 2 cwt. of nitro-chalk was no less than 7 sacks of barley, a second 2 cwt. of fertiliser gave an extra 3 sacks, and a final 2 cwt., making a total of 6 cwt. of nitro-chalk, still gave a worthwhile response of 1½ sacks. Thus in these particular circumstances on quite good land but in low condition up to 6 cwt. nitro-chalk was found to be an economical dressing for Proctor barley.

The highest yields were obtained where all the nitrogen was given on the seedbed; and the lowest yields and worst quality grain where the whole of the nitrogen was applied as a late top-dressing in May. There appeared to be no advantages, in terms of yield, from splitting dressings between two or three times of application, and the results showed that in 1957 the earlier the nitrogen went on the barley, the better. Assessments of quality showed, as might be expected, that the best samples were from plots receiving the lowest rates of fertiliser, and the worst from the 6 cwt. nitro-chalk per acre. There was a suggestion that splitting the lower rates of dressing had a slightly beneficial effect on quality: where all the nitrogen was applied at one time seedbed dressings were preferable and since this method of application gave the best yield it is probably as good way as any to fertilise Proctor barley with nitrogen.

MALTING AND BREWING TESTS WITH PROCTOR, PROVOST AND MAYTHORPE BARLEY.

In *The Sprowston Farm* for March 1955 reference was made to full-scale malting and brewing tests on Proctor and Spratt Archer barleys grown at Sprowston in 1953, the tests being carried out by

the Brewing Industry Research Foundation and reported in the Journal of the Institute of Brewing. The results of these tests showed that the malting and brewing qualities of Proctor compared very favourably with the traditional malting variety Spratt Archer.

In 1955 we grew barleys for testing by Messrs. Steward & Patteson of Norwich. The comparison between Proctor and Spratt Archer was repeated and generally confirmed the satisfactory quality of Proctor; and tests were also made on grain of the more recently introduced varieties, Maythorpe and Provost. In the latter case the investigation was in the nature of a preliminary trial of the malting quality of two varieties and no ale was brewed from the malts, but the performance of Maythorpe as a malting variety was promising, considering how dry the summer had been. Provost, however, did not malt so well and some difficulty was experienced in obtaining the required colour and quality for a pale ale.

Testing was continued with Maythorpe and Provost barleys in 1956. Enough grain of these two varieties was grown at Sprowston to carry out full-scale brewing tests; as in 1955 these tests were undertaken by Messrs. Steward & Patteson and the results are quoted from their report. In both years Maythorpe was characterised by a high 1000 corn weight as compared with Provost; as regards the percentage nitrogen in the grain there was little difference between the two varieties in 1956, but in 1955 Maythorpe had an appreciably lower nitrogen content.

In 1956 Maythorpe malted more readily than Provost and gave a better malt for pale ale brewing, but probably owing to the disastrous season neither variety produced malt up to the normal pale ale standard: the sample of Maythorpe had undoubtedly suffered owing to the crop having lodged in a very severe July storm.

Maythorpe has therefore on the whole shown itself to have satisfactory malting qualities, but unfortunately the weakness of the straw usually results in some lodging and deterioration in appearance of the sample.

Acknowledgment is made to Messrs. Steward & Patteson for permission to quote from their report of the tests.

VINING PEAS.

In 1956 the work with peas for vining comprised two experiments, one being a study of the nitrogen requirements of the crop and the other a yield comparison between peas drilled on 7-in. and 14-in. rows and also the effect on the peas of spraying to control weeds.

The results of these trials were discussed in *The Sprowston Farm* for December 1956. In 1957 the row widths and spraying

investigation continued in its original form but the fertiliser work was extended to test the effect of phosphate and potash as well as nitrogen and to find out whether there was any advantage in placing the fertiliser.

Fertiliser placement. Experiments at Rothamsted and elsewhere with peas grown on 14-20 in. rows have suggested that responses to phosphate and potash are increased by placing the fertiliser in a band 2 in. to the side and 1 in. below the seed. Vining peas have a short growing season and possibly the explanation of this better utilisation is that fertiliser, and particularly the phosphate, is concentrated more closely near the young root system and is therefore more readily available to the developing plant.

In the experiment at Sprowston the experimental treatments were as follows: no fertiliser, 2 cwt. per acre of superphosphate alone, 3 cwt. per acre of muriate of potash alone, superphosphate with muriate of potash, superphosphate and muriate of potash together with 1½ cwt. per acre of sulphate of ammonia. All these fertilisers were applied either broadcast or placed on 20-in. rows. In contrast to the results obtained elsewhere, placing the fertiliser gave no better yields than broadcasting. There was a marked response to potash, yields with potash averaging 49 cwt. of green peas as compared with 41½ cwt. where no potash was applied. This was to be expected from the potash status of the trial site, which soil analysis showed to be very low. Soil phosphate, however, was classified as medium-high and superphosphate failed to increase yield. As in 1955 and 1956, there was no response to nitrogen in the presence of adequate phosphate and potash. Neither method of application nor type of fertiliser significantly influenced the maturity of the peas as measured by tenderometer readings or determinations of alcohol insoluble solids carried out in the laboratory at Sprowston.

Row width and spraying trial. This trial was repeated with Thomas Laxton peas in the same form as in 1956, the aim being to compare yields of peas grown on 14-in. rows cleaned by inter-row hoeing with those on 7-in. rows sprayed with selective weed killers. The effect on crop and weeds of DNBP amine and MCPB both sprayed at 2 lb. per acre was also included in the treatment comparisons.

As in 1956, and irrespective of spraying treatment, row width had no significant effect on yield, although there was a consistent trend in favour of narrow rows. This year spraying with DNPB amine markedly increased yield by 3 cwt. per acre, a result presumably due to the reduction of weed competition. MCPB did not effectively control the dominant weed species (volunteer clover and chickweed) and gave no yield increase over the unsprayed plots. Maturity was not affected by row width or spraying.

These results were in line with our experience in 1956. Although hoeing peas on wide rows may be the cheapest way of growing the

crop, difficulties arise on farms where the hoeing equipment is kept busy throughout the season on sugar beet: peas grown in narrow rows and kept clean by spraying appear to yield rather better and the method is well suited to a farming enterprise where a large acreage is devoted to row crops.

N.I.A.B. CROP VARIETY TESTING SCHEME.

This year has seen the completion of the second season of the new cereal preliminary trials. Except for winter wheats, somewhat smaller numbers of varieties than in 1956 were in trial for the first time. The growing season was generally favourable and with better harvesting conditions than last year the grain harvest was completed by the end of August.

Winter Wheat preliminary trial. This trial, which included some thirty new wheats mainly from France, Belgium and Scandinavia, reached maturity in early August. Harvesting, however, was delayed by a period of rain and there was widespread shattering of the ears and shedding of grain when combining started. This was in contrast to 1956, when no shattering occurred although the delay in harvesting after the wheats reached maturity was appreciably greater.

Cappelle, reincluded in this trial as a standard, looked very well throughout the season. It was little affected by mildew, lodging, eyespot or shattering and gave the highest yield of 17·8 sacks per acre, 1·4 sacks better than Hybrid 46, whose yield was somewhat reduced by shed corn. The spring variety Peko, autumn sown, was the only other variety to outyield Hybrid 46, but as in the previous year excessive growth of straw (nearly 5-ft.) with poor lodging resistance detracted from its value as a winter wheat.

Heines VII was badly affected by mildew, yellow rust and shedding and yielded 2 sacks below Hybrid 46. Banco, which yielded 5 sacks less than Hybrid 46, ripened quickly after being late in maturity throughout the season and shed badly.

A large group of new French and Belgian varieties, including Elite Lepeuple, Prof. Marchal, Poncheau, Stella, Hestbignon and Vaillant, all varying in earliness and susceptibility to mildew and shattering, yielded within a sack of Hybrid 46. Various other winter wheats such as Leda and Marsters 57 are now in N.I.A.B. "main trials" elsewhere and were therefore not included in the Sprowston trial.

Winter Oat preliminary trial. Powys at 24 sacks per acre was the best yielder among the new winter oats and confirmed the favourable impression it has made at Sprowston in recent seasons. This year it yielded relatively better than the Cambridge CA.148

hybrid selections, which are similar in appearance but more than a week later in ripening.

Spring Wheat preliminary trial. The spring wheats also suffered from shattering of the ear at maturity and shed grain reduced the yield of those varieties specially prone to this trouble. Atle and Koga II, however, were little affected by shattering and Koga II again showed a marked superiority to Atle, outyielding the older variety by some 2 sacks per acre. On this occasion Koga II was equalled by the red-chaffed Belgian Hybrid Jufy I despite the fairly severe shedding shown by this variety: the German variety Carpo, stiff-strawed, clean-chaffed and strongly resistant to shattering, again looked promising and yielded 1·7 sacks more than Atle, as did another new German variety, Probat.

Spring Oat preliminary trial. Spring oats at Sprowston gave a light crop this season, Sun II yielding only 12 sacks per acre. As in 1956, the Dutch variety Zandster outyielded Sun II by some 2 sacks, but again showed its inferior lodging resistance. Of the 23 other varieties in trial, the majority of which are in many respects similar to Sun II, eight yielded slightly above Sun II and none of these were superior in other field characters, except for the Aberystwyth 4757 series, which again showed excellent mildew-resistance.

Pendek, a week earlier and 10-in. shorter in the straw than Sun II, brackled badly when ripe and yielded half a sack less than that variety.

Spring Barley preliminary trial. Of the 14 varieties in the preliminary trial only 3 were in the same yield class as Proctor and all of these surpassed their usual level of yield in past trials. Ingrid and Vada resembled each other in that they were early, short and stiff-strawed; Piroline, an early German mildew-resistant variety, gave 1·5 sacks per acre more than Proctor but was considerably longer in the straw. Of the remaining varieties, eight yielded within half a sack of Proctor, Ymer and Glasnevin No. 3 in particular showing relatively better than they normally do.

In the international variety trial Domen, on the advice of the breeder, was drilled at a higher seedrate than the other varieties and yielded slightly better than Proctor.

New varieties Beka (French) and Wisa (German) were disappointing in both trials and yielded appreciably below Proctor.

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