THE FARMER'S VIEWPOINT

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In asking me to put the farmer's point of view as to the practical possibilities of the use of "controlled droplet application" (C.D.A.) on farms, the organisers of this symposium have taken something of a gamble! I live and farm in what used to be called the East Riding of Yorkshire, now regrettably North Humberside, and not very far from a well respected agricultural engineer and innovator, namely Mr Horstine Farmery. I have a great respect for Mr Farmery and we have done trials with one of his prototype C.D.A. machines, but that does not say that I am in anyway convinced at this stage that a revolution in "pesticide" application, to use the word in its generic context, is going to revolutionise our farm operation during the next five years.

I do, however, suggest that you can regard me as a fairly typical farmer, because although our farming acreage is quite large, we do operate as separate farm units.

Perhaps I should explain how we operate and on what scale. We have seven operational farm units, ranging from the largest over 2,000 acres (810 hectares) to the smallest 350 acres (142 hectares). Our farms are located along a line running east to west, some 30 miles in length, stretching from a point within five miles of the North Sea near Hornsea to a point on top of the escarpment of the chalk Yorkshire Wolds, at an altitude of 700-800 feet, overlooking the plain of York. About half of our land is chalk wold, the other half on the eastern side is glacial drift, consisting of both sand, gravel and boulder clay, which forms the plain of Holderness. The distance between farming units varies from 5 to 15 miles, which necessitates "on the spot" management and a relatively self contained complement of labour and machinery on each farm.

Our system is based primarily on cereals, (wheat production being over 50% of the cereals grown) which is supported by break crops which occupy about a third of the acreage. Our principal break crops are one year ryegrass leys utilised by beef, vining peas, sugar beet and potatoes. The area planned for 1978 for the various crops is as follows:-

	Acres	Hectares	
Winter Wheat	2107	853	
Spring Barley	1387	561	65%
Spring Oats	163	66	
Vining Peas	666	269	
Sugar Beet	369	149	35%
Early & Main Potatoes	267	108	
One Year Temporary Grass	687	278	
TOTAL	5646	2284	100%

In addition there is 467 acres (189 hectares) of permanent grass, mainly steep dale side, a feature of the higher wold farms, which is devoted to suckler beef production.

Of course, the North East coast, in common with much of Eastern England, is dry, cloudy and cool. Last year on our high wold farm we measured 30" (763mm) of rainfall, at our farm near the coast 28½" (722mm) and at Southburn in the centre 24¾" (630mm). We had a wind speed of 6 mph and below on only 14 days in the area during the main spraying months of March and April.

Our climate has however some compensations. It is suitable for growing high grade malting barley for example and excellent "high sugar" vining peas. We are completely free of blackgrass and have comparatively few wild oats. Our chalk wold land is particularly suited to the production of seed corn of good vigour and quality. Our crop production, therefore, demands a high standard of clean, i.e. weed free husbandry, and the reward can be useful premiums for quality.

There is, therefore, every incentive to make wide use of "pesticides" whether they be herbicides, fungicides or insect pesticides, if the traditional controls such as rotation, cultivations and choice of varieties do not satisfactorily contain the problem. My basic training and subsequent experience continues to suggest that minimum doses of synthetic chemical, whether it be fertiliser or pesticide, which is consistent with optimum yield, should at all times be selected. I would add, subject to achieving a "tidy" field appearance, for which I am quite prepared to pay a little extra in order to have the pleasure of either driving past or walking through clean attractive crops!

Nor are we very adventurous with new chemical preparations, always waiting until there is clear evidence that the new product has no undesirable side effects and this has been clearly demonstrated in the district. New products tend to be expensive, and on land that is of only moderate inherent fertility, it is essential to be cost conscious in relation to the yields that are actually obtainable.

I think we must be most careful with the current "high yield" blue print quest, not to be carried away into thoughts of five ton crops of winter wheat, or 30 tons/acre (75 tonnes/ha) of potatoes, unless we have got a soil and system capable of expressing this sort of yield. Therefore our spray budget must always be tailored financially to match up with realistic target yields.

In 1977 for example our total spray chemical bill for 6000 acres (2430 hectares) farmed was £32,500. The average expenditure on cereals, including wild oat control where necessary, was £5.70 per acre (£14.08 per hectare), vining peas £5.60 per acre (£13.83 per hectare), potatoes maincrop £14.10 per acre (£34.85 per hectare) and sugar beet £18.25 per acre (£45.07 per hectare). For our 1978 budget we are only allowing 10% increase in these costs and I shall be very disappointed if we find it necessary to exceed our budget.

Our "pesticides" are applied through seven conventional farm spraying machines, all are mounted, three being "saddle tank" sprayers and four being rear mounted. These machines on our seven "farms" deal with a total of 12,000 acres (ca. 4800 ha) of spray work of one sort and another during the year. The only contractors support was in the application of aphicide to 1,700 acres (688 hectares) of winter wheat and a small trial acreage of blight spraying done by fixed wing aircraft.

The normal application rate was 20 galls per acre (225 litres per hectare) i.e. about ½ million gallons of water, weighing about 1,000 tonnes! With large fields and a generous rate of water application, drift is not a serious problem, although I do appreciate the advantage of restricting droplet size to 250 µm, which is the

characteristic of the C.D.A. technique. Frequently an application will be a tank mix of compatible chemicals. Whilst we must be wary of sacrificing either a lowering of performance, or increasing the danger of crop damage, by mixing cocktails, I do believe that the tank mix of materials designed to do quite specific jobs is valuable in reducing application costs. How shall we fair in this respect with C.D.A.?

It is easy to look at the logistics of these figures in an office and conclude that the whole job could be done far more efficiently by a very large high capacity self-propelled spraying unit, and perhaps better still, by a unit equipped with C.D.A. spinning discs, than by seven smaller machines all needing a competent operator. I am sure there will be a contractor who will say "give me the whole job and I will get the necessary pesticides applied more cheaply and with a greater degree of accuracy and timeliness". I am sure also there are contractors who can offer a service in this way for most of our field work. We could have all our drilling, including the precision drilling of sugar beet, done by contractor; we could have all our harvesting, including the sugar beet and potato harvesting, done by contractor. The trouble is that this approach forgets the importance of the "farmer's foot". I am convinced that a high standard of husbandry will only be achieved if a reasonable acreage of land is devoted to the exclusive care of a dedicated farmer or manager. The "farmer's foot" is immensely important and far more important than the advisor's or contractor's foot, or in my case, the managing director's foot! I believe that the success of our farming enterprise is due very largely to "devolution" at the farm, where a manager is entrusted with day to day decisions on a size of farm that he is competent to control. For me, a wireless controlled head office bureaucracy is the road to frustration and the acceptance of moderate standards. It has no place in the high cost farming situation which exists in the U.K. today. Here, therefore, is C.D.A. problem number one.

I believe we will continue to use a pesticide applicator which matches a 700 acre farming unit and is capable of applying the full range of materials that would be required on this size of enterprise. This implies a machine which will be carried by the conventional farm tractor, normally fitted with narrow wheels and suitably matched to tramlines. Unfortunately, tractors are tending to get heavier, which can create problems of undesirable soil compaction in the tramlines and rutting which creates harvesting problems, most noticeably in cereals and vining peas. Solid fertilisers have remained substantially cheaper in unit cost, particularly nitrogen, and so the sprayer boom width is often restricted to the maximum accurate spreading distance of a spinning disc fertiliser distributor, i.e. 40 ft (12.2m).

The pneumatic solid fertiliser distribution could in theory overcome the bout width problem, i.e. permit 20 metre tramline spacing and the benefit of reduced yield reduction, but the equipment currently available is costly, complicated and insufficiently accurate to be considered. It is also disappointing that improvements in the formulation of liquid fertilisers have so far failed to overcome the disadvantages of low concentration, scorch and specialised storage installations. I do use liquid fertiliser on a third of our acreage, in fact the big 2000 acre wold farm, where the benefit in reduced bulk handling of solid fertiliser is significant. I keep hoping that my pipe dream of buying only concentrated solid straight nutrient, to which I can add my own water at the time of application, will one day come true. If this breakthrough provided nutrients more cheaply than in granular compounds then I believe we would readily change to liquid fertilisers throughout. In doing so, we would need "dual purpose" conventional spray applicators on all farms and not as at present, on the big 2000 acre farm only. The future of liquid fertiliser must have a bearing on the choice of design of the sprayer for the future.

It is expensive and difficult to utilise high clearance conversions for conventional tractors which restricts the use of our existing equipment in cereals after ear emergence. The advantage of the aerial spraying contractor shows up most clearly when "epidemics" arise and the speed of application under the circumstances fully justifies the cost. The performance of the fixed wing aircraft is remarkably good when conditions are suitable and the problem is "on top" of the crop, e.g. aphids, rust etc.

There is still the problem of 1000 tonnes of water. Before I accept the argument that C.D.A. can save a substantial amount of money on water carting I would like to know what improvements can be achieved using low volume application, i.e. 8 to 10 gallons per acre (100 litres per hectare) with better designed T. jets etc. coupled with the appropriate formulation of chemical material. Even at 20 galls per acre (225 litres per hectare) we find it perfectly possible with a good water bowser to apply herbicides to 200 acres of winter wheat in a long day, with a mounted saddle tank sprayer following tramlines. A 180 gall (2000 litres) rear mounted conventional sprayer will by comparison do 100 acres in a good day. In each case this represents approximately half the acreage of a particular crop that requires simultaneous application.

The recent W.R.O. work effectively portrayed by Mr David Tottman has produced a much clearer guide to the "safe" period for applying hormone weed killers to winter wheat. Wait until there is 5 cm between the ground and the base of the last leaf sheaf on the main tiller and then get on quickly in the space of 7 to 10 days before that distance will have extended to 10 cm. It may well be that there will be no days suitable for spraying in that critical short period and so it will not matter whether we are using a conventional hydraulic jet or a C.D.A. applicator, if we are to get the job done before there is a severe danger of damage and corresponding yield loss.

Clearly the use of either pre-emergence residual "urea" based autumn applied herbicide or autumn applied mecoprop offers the insurance that we badly need. It is the same story with both sugar beet and potatoes in the spring. The practice that we have been following for a number of years is to use an appropriate pre-emergence residual herbicide at a moderate dose and then complete the job with whatever is the appropriate follow-up herbicide as necessary in May.

Thoughts of an ultra lightweight self-propelled applicator carrier on the lines of the prototype now under trial at the W.R.O. would allow us to make our insurance in winter cereals more effective. I think however, once again we must not assume that this ultra lightweight carrier would necessarily need C.D.A. equipment. If we can get low volume conventional hydraulic jets operating at the land speed required, then the water weight problem might not be critical.

Whilst I am very interested in work currently being done by the N.I.A.E. on lightweight low pressure vehicles, and recognise their advantage, I cannot contemplate any additional machinery costs being set against our current crop costs. Whereas the cost of growing an acre of wheat (including a notional rent) in 1976 equated with just over one tonne of grain; in 1978 it will be nearly two tonnes if we only receive £80 per tonne!

Intensive arable farming has a major problem which must be recognised as unavoidable. Market forces, and in particular Common Market forces, make it necessary for farmers to produce a range of products, each of which requires a sophisticated discipline and often specialised range of expertise and specialised machinery to produce acceptable returns. In the traditional rotational sense this has benefits for the land and for the incidence of pests and diseases, but does create a management problem rarely faced by producers in other industries. This situation leads to criticism of farmers for being slipshod in their attitude towards

husbandry tasks, care and maintenance of equipment etc. It is undoubtedly an inherent problem which we as an industry have got to live with, and the manufacturer of both spray chemicals and the equipment for their application has to recognise more clearly. In other words I am reminding you that recommendations have got to be very straightforward and the equipment must be very easy to use and to maintain. I will always buy the piece of equipment that looks most likely to do a job effectively but has the least number of moving parts. The C.D.A. applicator of the future must, therefore, be robust, simple as well as being cheap to run. The great advantage of liquids is that they flow and can be pumped. On the whole a conventional hydraulic spray applicator with a good quality pump, sound tank and a well designed boom, gives very little trouble. Hydraulically driven spinning discs must be prone to wear and I suspect could be expensive to maintain.

I apologise if my contribution tends towards a conservative and rather cautious approach to what must undoubtedly represent the potentially biggest breakthrough in "pesticide" applicator design since we started applying solutions of copper sulphate to kill charlock! I merely suggest that I am perhaps fairly typical of the farming consumer, i.e. the market which most of you here today have to service. I have greatly enjoyed meeting and listening to the contributions of the many experts in differing fields who have taken part in this symposium. I have learnt a great deal and will go home a good deal wiser and with a determination to look much more critically at all aspects of the effective application of what has now become an essential part of crop husbandry.