

Small Farms in a Fertile Tract

Trends in a North Indian Village: 1930s–2012

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From late colonial rent reliefs and agricultural researches to the recent land acquisition bill and the “second green revolution,” Indian agriculture has seen several transitions. This paper tracks detailed quantitative and qualitative evidence on long-term shifts in agricultural practices, yields and land relations in Dhantala, a village in western Uttar Pradesh, from the 1930s to 2012. This is done with the help of family and *kutcherry* records, elders’ recall and surveys as well as the interviews conducted personally in three revisits since 1989. This study combines anthropological and oral history methods to reconstruct agrarian change. Located in a well-irrigated, fertile tract and having experienced land redistribution prior to economic liberalisation, this village helps in grasping the limits and scope of agricultural growth in a predominantly small and marginal farm structure supported by favourable soil.

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Twenty kilometres south of Meerut city, in western Uttar Pradesh, exists a village called Dhantala with an unusual class profile. The official name of Dhantala is Rasoolpur–Dhantala; villagers, however, use the shortened title. Lying in the middle of the Ganges–Yamuna Doab, this community of 2,600 odd residents not only enjoys excellent soil and irrigation support, but also has a low proportion of landless labour and few big farmers or absentee landlords. The partition of big holdings (under a ceiling of 18 acres on irrigated farmland) and the subdivision of village’s land of the Land Management Committee (LMC)—a body of the panchayat looking after the common land of the concerned village—among the landless in 1984, helped in reducing land inequality in Dhantala over generations. In 2015, even as communal tensions flared up in Meerut and adjoining districts, Dhantala’s Gujjar, Dalit and Muslim neighbours maintained peace and friendly relations as before.

Hoping to fertilise the concerns of economists with methods of oral history and anthropology, this essay charts long-term changes in agricultural practices, costs and incomes in the fertile, small farms¹ of Dhantala with data from three revisits to the research site (in 1989, 2006–07 and 2012–13).² Since my first visit to Dhantala corresponded closely to the onset of economic liberalisation in India, it helps today in tracking the local impact of the said policy shift also on a limited scale.

A long-term study of farm practices calls for a major engagement with quantitative data. However, collecting precise figures on changes in population, crop yields and costs, etc, can become unmanageable when documentary evidence is scant, patwari’s records are incomplete and unreliable, and subjects’ responses show variations.³ At the same time, the choice made by some researchers to minimise measurement in the field seemed inappropriate in present work. Hence, an attempt has been made here to offer counts for economic indices wherever possible with the disclaimer that some of these are rough approximations, especially in pre-1989 figures based on group discussions with village elders, besides a few private and tehsil (subdivisional) records. Despite this, the fidelity of our data to broad trends on the ground is not in doubt and has been reassured through several safeguards. For example, the paper uses actual names of places and residents (wherever it was safe and permitted by subjects) and follows up quantitative evidence with considerable qualitative observation, case studies and life sketches. In order to make subjects partners in this multivocal study, I also tried to give voice to their

comments constantly and maintained field notes in Hindi—the local language—besides sharing all statistics and also the draft of this paper with the educated in Dhantala. Indeed, the extent of interpersonal knowledge among villagers and their extraordinary candour and accessibility, especially of elderly men, and of course, their generous attitude to my endeavour were of immense help in shaping this long term, multi-method study.

Dhantala's Demography

Elders recollect that Dhantala's population was about 800 in the 1930s and grew to 1,100 by 1951. In my first survey of the village in 1989, I counted 2,080 persons and in 2006 it was 2,710. A minor contraction has been visible in the last six years, as numbers came down to 2,504 by May 2012 with falling birth rate and growing emigration from the village.⁴

The principal castes residing in Dhantala are: 56% upper middle castes (Gujjars and Jats) and 11% lower middle castes—Kumhars and Lodhs (11%).⁵ Among others, the Dalit or Scheduled Castes made up 24% (including Jatavs (20%) and Valmikis (4%)), while Muslims constitute approximately 9% of the community. In 1989, the village had 59% upper middle castes, 12% lower middle castes, 19% Dalits, 9% Muslims and two *savarna* (upper caste) families too.

Major Transitions

The 20 Gujjar lineages that dominate the village today trace their histories to the 1780s when their cattle-rearing ancestors migrated from Faridabad and other districts on the initiative of Rasool Baksh—a scion of Yahya Khan—the local zamindar of five villages. The fertile soil of Dhantala and the presence of two ponds and a water channel encouraged them to adopt cultivation, and thus, realise that prosperity which gave the village its name, meaning “the abode of wealth.”

Meanwhile, the “colonial peace” benefited title-holders whose land values rose with political stability and falling tax dues (relative to prices) after 1914.⁶ But tenant-cultivators in the region got little relief from high rentals as tenancy protection laws passed by the provincial government in 1921 and 1926 (in the wake of the peasant upsurge accompanying the non-cooperation movement) did very little for the mass of poor tenants.⁷ The third major break in the agricultural history of Dhantala came in the 1950s and 1960s when zamindari abolition and introduction of chemical fertilisers raised yields and brought down the need for fallows. Till 1950, about 400 acres of common land of Dhantala had been left for grazing and forestry. When encroachment was finally banned, about 100 acres from this was brought under cultivation by a growing population till 1970. The biggest change, however, came in the late 1960s and 1970s with a jump in wheat and rice yields in the wake of the Green Revolution. The 1980s saw the White Revolution and allotments of fields to the landless from the remaining commons after a valiant agitation in 1982–84. As a result, three acres of cultivable land (including any held by a beneficiary) were allotted to 140 men (110 in 1984 and 30 more in 1990s) from the said commons.⁸

The agitation which brought this change was backed by labourers and aided by the local unit of the Communist Party of

India (Marxist) then led by a dedicated comrade, Satpal. Similar attempts were made in other villages but with little success. The conjuncture which enabled the radical change in Dhantala included factors like availability of 300 acres of common land, the unity shown by Dalits and Kumhar leaders who demonstrated at Meerut for a fortnight; rivalry within the dominant Gujjars because of a rebel called Tekram who aligned with the landless; and the helpful attitude of the then commissioner of Meerut towards the agitators. As a result, in 1984, the proportion of landless labourers in Dhantala's male workforce came down to nearly zero. Even today their share is less than 10% in contrast to surrounding villages where it goes up to 50%.

The last quarter of the 20th century is also memorable in the region's agricultural history for a “grey revolution” whereby motorised machines replaced muscle-driven appliances like *rahats* (persian wheels) and ploughs in the fields. This turnaround reduced labour as well as financial costs of farmers in ploughing, sowing and irrigating as well as harvesting, threshing and transporting though the intervening stage of manuring and spraying is still based on manual work largely.

The latest transition in local agriculture has come with a relative fall in the ratio of farmers, and growing emigration from the village due to rising construction and services in cities, in the wake of economic liberalisation. This helped in raising wages in villages too and in increasing state's revenues for higher welfare spending after the 1990s as on the food for work programme, highly subsidised foodgrains, pensions for poor widows, the aged and the disabled and on enhanced minimum support price for major crops. However, the impact of such measures on the ground has been very limited around Dhantala because of corruption and mismanagement in most such schemes in the region.⁹

Occupations

Amidst these broad transitions, the occupational profile of Dhantala also saw slow but significant mutations which gradually reduced the overlap between rurality and agriculture. Out of 434 households (identified by shared kitchens) in the village, in 2012, 344 had agricultural land and 237 of these had one or more members engaged in non-farm work. The proportion of non-agriculturists in the village has thus risen and reached 365 among 912 workers (excluding home-based livestock-rearers) by 2012 (in contrast to just 159 counted in full-time non-farm work, in 1989). The precise estimate of time spent by people in

Box 1: Shades of Multitasking

Tejpal Jatav was 20 years old in 1984, and being landless, he was also allotted a holding of three acres following the land agitation in Dhantala. He had been a leading participant in the movement and stood boldly as witness against the old pradhan of the village despite threats, in the prolonged court battle that followed.

Meanwhile, he married his brother's widow in 1973, and was burdened with the upkeep of three children at a young age. While the ownership of three acres made Tejpal better off, his expenses were also rising as one more son and two daughters were born to him. In order to make ends meet, he began working as a mason (demand for masons has grown since the 1990s in and around Dhantala). His wage grew from Rs 50 in 1990 to Rs 400 per day by 2013.

The total earning of the extended family, in 2013, was Rs 16,000 per month including 6,000 from masonry (working for about a fortnight per month) and about 10,000, per month, from cultivation. The family of eight thus earned only Rs 2,000 per month per capita, despite having their own field and three breadwinners including one woman.

different occupations by categorising rich or poor earners was difficult. But, my last survey showed that about 100 men in the village who describe themselves as *kisans* or agriculturists actually spend more time in non-farm work, like construction and services (Box 1). Most of them also earn more from non-farm work. Of the 434 households in Dhantala, 370 also had milch cattle and marginal farmers were generally earning more from milk than from cultivation in 2012 (Table 1).

Table 1: Yearly Earnings from Cultivation in One Acre with Optimum Input under Normal Rain (2013–14)

Produce Harvested (quintals)	Value in (Rs/acre)
Wheat harvested in March	18 quintals × Rs 1,400 per quintal = Rs 25,200
Coarse paddy harvested in September	20 quintals × Rs 2,500 = Rs 50,000
Value of by-products	Hay from wheat Rs 10,000 Stalk from paddy Rs 2,000
Value of total output/acre	Rs 87,200
Paid out costs of rice + wheat cultivation	Rs 36,000
Yearly net earning/acre	Rs 51,200
Average monthly income from cultivation	Rs 4,400
Net earnings from two buffaloes per annum	Rs 60,000 (Rs 160 daily from two buffaloes on average)

Yields counted are the best reported per acre in Dhantala under normal rain and investments of a small farmer who hires tractor and tube well services.

Source: Personal and group interviews with 12 farmers in Dhantala in 2013.

In this light, it is no exaggeration to say that a slow “subsidisation” of cultivation, in the local economy, is underway now. Factors propelling agriculturists towards non-farm occupations are: growing demand for manual labour and rising wages, especially in construction since the 1990s; shrinking of landholdings and the rise of mechanisation leading to less requirement for labour on diminished fields and improvements in educational facilities and transport links to cities over time.

Landholdings

The total area of Dhantala is 1,550 acres of which about 1,300 are under fields while about 200, in the centre, are covered by buildings, roads and two ponds.¹⁰ With its population more than tripling from 800 to 2,500 between 1930 and 2012, per capita availability of agricultural land fell from two to less than three-fourths of an acre, though per family availability is three acres, on average.¹¹ Indeed, with negligible family planning, most of the middle and small farms¹² of Dhantala turned marginal with less than one hectare (1 ha) by the third quarter of the last century and submarginal with less than one acre by its end (Table 2).

Another striking development in Dhantala is that the relation between average, optimal and subsistence holding size changed drastically from early 20th century. While land required for the survival of a family (above the poverty line) may be one acre today (because of increased yields), it would have been around five acres, in the early 20th century, when yields were less than a fifth and some land had to be kept fallow. At the same time, the optimum land that a family (with two agriculturists) could handle was also five acres before the introduction of tractors and tube wells. Today, with some hired labour for harvesting and sowing, two agriculturists can manage up to 25 acres and up to 60, with harvesters and reapers.¹³

Land distribution itself is relatively egalitarian in Dhantala now in contrast to the pre-independence times when a single landlord with two big farmers dominated a village of mainly tenants and labourers. The land register (*khaskra-khatauni*) of 1930–35 (at the record room in Meerut *kuchehri*) mentions five types of cultivators: zamindars (landlords), *kabil kashtkars* (small title-holders/landowners), *khud kashtkars* (registered tenants paying fixed rents), *pahi kashtkars* (temporary tenants) and *bataidars* (sharecroppers) besides landless labourers. Tenants from middle castes became landowners in the 1950s with the abolition of zamindari, while the landless (mostly Dalits) had to wait till 1984 in Dhantala for relief.

Another change in the nature of landholdings in Dhantala pertains to their size. While yields were low, in early 20th century, as per the land record of 1935, even tenants had holdings of up to 40 acres. Today, even middle farms (measuring 10–15 acres) are extinct while just a generation ago, I had counted five big farmers (with 20 acres each) and 25 middle farmers in the village. In 2012, Dhantala’s 356 family holdings fell under seven broad categories: 36 were petty (less than half acre), 46 were sub-marginal (between half and one acre), 141 were marginal (having between 1 ha and 1 acre), 93 were small farms (between 2.5 acres and 5 acres), 29 were semi-middle farms (between 5 and 10 acres) and only two were middle-sized (between 10 and 15 acres). While marginal farms can be taken care of by a single farmer, small and middle farms are generally looked after by two members in a peasant household. Interestingly, in 2003, three brothers (whose agricultural land near Meerut had been acquired by the Meerut Development Authority) bought 40 acres in Dhantala for horticulture on a “semi-capitalist” scale (with regular hired labour and three tube wells and tractors). The venture did not succeed because of poor power and road infrastructure and two of the brothers sold off their shares, in 2014, following disputes and losses.

Table 2: Operational Costs/Acre in Paddy Cultivation (2013–14)

Process Name	Costs in Rupees
Ploughing by harrow, tiller/rotor	3,500
Water (10 times for 6–8 hours each) at Rs 60/hr (30/hr with electric pump and 100 with diesel)	3,840
Seed (8 kg paddy/ <i>moonjee</i> in 1 acre)	480 for good quality
Weeding (hired labour)	1,000
Transplanting eight labour for 1 acre in one day, including two family members (1 July–15 August)	2,000
DAP (one bag) + urea (two bags)	2,000
Pesticide after flowering	700
Watering every eight days till June and every 15 days till September	(counted above)
Weeding	500
Harvesting, including cost of two family members	1,500
Threshing	1,500
Transportation	500
Commission to <i>mandi</i> dealers	1,000
Total	18,020

Costs incurred by a farmer using hired tractor and tube well services. Expenditure on irrigation would vary with the amount of precipitation; irrigation costs estimated here are for normal rain.

Source: Personal and group interviews with 12 farmers in Dhantala in 2013.

Apart from landowners, there were eight tenant cultivators in Dhantala in 2012. Reverse tenancy has emerged as a new phenomenon whereby poor emigrants leaving the village now lease land to better-off farmers who have machinery and capital and pool land from others by paying rent. In 2013, the rent given by Satveer (who uses his own tractor and other inputs) to three such petty “rentiers” was Rs 15,000 per acre, per annum which amounted to about a third of the net income from two harvests.

Crops

Like much of western Uttar Pradesh, Dhantala’s agriculture is dominated by sugar cane and up to 70% of its farmland is under this crop. Cane cultivation started picking up in Dhantala from early 20th century, but its dominance over other crops became conspicuous in the last quarter. Sugar cane gives only one harvest a year and requires a lot of water about 12 irrigation cycles in a year even under normal rainfall. Yet, it has been preferred by many as it is disease- and frost-resistant and brings cash returns helped by state’s support price (though delayed payments from sugar mills remain a worry for local farmers).

Before the growth of cane cultivation, millets and peas had been the principal staples which were followed in the late 1960s, by high yielding rice and wheat that reduced coarse grains to a minor category (for cattle-feed) here. Even now, 30% of cultivated land is covered by wheat in the rabi season along with some mustard, and by paddy in kharif along with some pulses. Paddy, however, has many varieties and price variations. The paddy most commonly grown in Dhantala is Sugandh—a middle variety between coarse and the costly Basmati. Besides this, vegetables are grown by some along with sugar cane or between kharif and rabi crops. The majority, however, does not prefer this (despite rising prices of fruits and vegetables) because of their perishable nature, price fluctuations, heavy requirement of labour and other inputs and extremely poor power, storage and marketing infrastructure in the province besides little support for crop insurance or support price from the state.

Yields and the Green Revolution

It was difficult to calculate average yields for various crops by tracking outputs in all fields of Dhantala. In order to get an idea of yield trends, optimum/highest reported yields for wheat, paddy and sugar cane have been compared here over time. Ninety-year-old Suraj Bhan informed that in this fertile belt also, optimum yields in wheat and paddy ranged at best between three and four quintals, per acre, before independence.¹⁴ Also, farmers were forced to leave nearly half of their land fallow in the early 20th century to maintain soil fertility.

With improvements in seeds and irrigation and the introduction of chemical fertilisers since the 1950s, the requirement for fallows declined and optimum yields rose to about six quintals by the mid-1960s (on the eve of the Green Revolution). The abolition of zamindari and the devolution, in the 1950s, of land titles on Gujjar tenants raised productivity.¹⁵ The jump in yields was, however, dramatic in the late 1960s when high-yielding varieties (HYVs) like Kalyan Sona and Narma Roja (for

wheat), IR-8 for paddy and CO-1148 (for sugar cane) were adopted and yields of up to 14 quintals/acre for wheat and paddy were realised. In 2012, the highest yields noted for wheat, coarse paddy and sugar cane per harvest were 18, 22 and 250 quintals/acre.¹⁶ Actual yields, of course, vary according to inputs and weather and averages could be, at best, two-thirds of the optimum even under normal rainfall, according to villagers.

The Green Revolution is rightly credited for freeing the country from large-scale famine deaths and saving the burgeoning segment of marginal and submarginal farmers from destitution besides giving a push to the growth of the rural non-farm economy by raising incomes through intensive cultivation giving a fillip to the emergence of shops selling consumer products, gadget repairs and services like those of drivers, etc.¹⁷ No doubt, the HYVs required higher investments in seeds, water and fertilisers, generating a debate about the ability of small farmers to reap their benefits. Evidence from Dhantala suggests that the technology is not related to land size in this irrigated belt and only the poorest households who completely lack capital seem incapable of benefiting as HYVs require an additional investment of only a few thousand more. This does not add even one-third of the total operational cost of the farmer. On the other hand, small farmers are benefiting from mechanisation and Green Revolution also as smaller, efficient tractors and submersible pumps (available on hire now) have brought these machines within their reach.

Land Reform and Productivity

While yield rates do not vary much with farm size, ownership does make a difference in productivity. Thus, yields as well as output increased in Dhantala, after 1984 when the landless received land. Not only was a 300 acre patch brought under additional cultivation but the proportion of independent small farmers increased, raising their stake in intensive cultivation. I did not calculate the rise in productivity brought by the expansion of independent farming in 1989. Yet, oral evidence confirmed that yields on own farms have been higher than on fields worked by tenants or hired labour. Meanwhile, land yields continued to rise through the 1980s and the 1990s because of continuing improvements in seeds. Residents report that maximum gains in yield rates, after the jump from HYVs in the late 1960s, have been seen in paddy.

But the growth of output per acre is not the only way in which agricultural incomes increased. A major change involved a switch to two–three crops a year as against a single harvest with which many villagers contended in early 20th century because of fertilisers, HYVs and electric pumps. The HYVs also speeded up the crop cycle by shortening the ripening time of seeds. Today, about three dozen farmers cultivate three crops annually in Dhantala, generally adding vegetables like potato and bottle gourd to staples.

Irrigation

Yields could not have risen despite HYVs without a turnaround in irrigation. According to locals, modern seeds require minimum four watering cycles for wheat and at least 12 for sugar cane and

paddy under normal precipitation. Dhantala had no major water channel except a small stream polluted by flows from Partapur factories near Meerut and two ponds used for livestock rather than irrigation. Canals and tank irrigations were never available in the village though canals built on the Yamuna and the Ganga in the 19th century pass at a distance of just 40 km.

Traditional irrigation, in the village, was based on *chars* (leather buckets which lifts water from a well) or *rahat* (using a more efficient rotational motion for animals and metal buckets). Both relied on animal power with at least two alternating bulls/water buffaloes deployed per well. While *chars* could irrigate up to one-third of an acre, in a day, the *rahat* could serve about two-thirds. The first government tube well was installed on the boundary of the village in 1935, while the first private tube well was bought by the then *pradhan* of Dhantala—Bhagmal—in 1961. At that time, there were about 30 *rahats* in the fields and four wells inside the village for drinking water.

Mechanised irrigation grew in the late 1960s when private tube wells were brought by several landowners after the arrival of *HVVs*. By the time of my first survey, in 1989, the number of tube wells had increased to 45 and *rahats* had disappeared. By 2012, there were 199 tube wells including 45 submersibles. The 150 peasant households who did not have their own pump sets used to hire from others on hourly basis. In 2013, the charge for hiring a tube well was Rs 30/hour, if run on electricity and Rs 100–Rs 150 on diesel.

The growth of tube well irrigation in Dhantala helped in making three crops a year possible. On the debit side, depending on ground elevation, the groundwater is getting decreased since the 1970s from a depth of about 12 feet to more than 60–120 feet now. Residents say that the water table is falling at the rate of about one foot every year. The arrival of submersible pumps has averted a crisis on the surface, but in future borewell pipes can touch the underneath rocks easily. Yet, the state and the community appear indifferent to this grave issue. Public investments in water recharge and tank irrigation has been poor. Central and state governments have announced 90% subsidy on purchase of drip and sprinkle irrigation equipment besides allocating Mahatma Gandhi National Rural Employment Guarantee Act fund for water harvesting. Yet, corruption in concerned departments, lack of community actions like interventions of non-governmental organisations as well as restraints on corporates' entry in farming have stalled progress in this field.

Mechanisation

Agriculture in Dhantala was entirely based on muscle-driven machines like *rahats*, bullock carts, ploughs and *kolhus* (oil presses) till the 1960s. In the last four decades, the village has seen a grey revolution or entry of machinery that has reduced the labour, financial and time costs in cultivation. The first tractors and threshers were introduced in Dhantala in the late 1960s, improved versions came in the 1990s along with private tube wells. The number of tractors went up from 20 in 1989 to 45 in 2012 and of threshers to about 40. In the 2000s, “computer levellers” for ploughing and cell phones with sms alerts (in Hindi)

appeared. However, larger machines like combine-harvesters and reapers (which are being used in Punjab and Haryana) are not visible in this region.

Still, even limited mechanisation has immensely reduced drudgery and the time needed for cultivation. A rough calculation shows that growing wheat in 1 ha before 1960, without tractor, thresher or tube well, required at least 122 days of labour in a five-month cycle, while now with motorised machines that has come down to less than 85 working hours spread over just 20 main days of work, excluding time spent on daily inspection.¹⁸ The cost of machines is no doubt huge for a poor farmer. But charges for feeding livestock daily are even more as cattle-feed itself costs at least Rs 75 for one bull per day or Rs 27,000 per annum (in 2013 prices). Against this, the cost of hiring a tractor and a pump for all stages in the cultivation of two crops in an acre came to just Rs 14,000.¹⁹ The cost of a tractor today ranges from Rs 4 lakh to Rs 15 lakh depending on size. Similarly, a thresher costs up to Rs 50,000, while the installation of a tube well (including boring) costs at least Rs 1,50,000. In the 1970s, the costs were approximately Rs 50,000 and Rs 20,000 for one tractor and a tube well, respectively. Thus, the relative price of machines has fallen over time when compared with the wholesale all India price index which rose from 7.5 to 170 between 1970 and 2013 (taking 1993 as base year). As mentioned, poor peasants who cannot buy farm machinery hire them regularly now. Rajveer *tractorwala*, for example, charges Rs 900 for ploughing one acre twice and earns about Rs 10,000 per month, after deducting depreciation and interest paid on loan for the machine.

Missing Development

Mechanisation in Dhantala's agriculture still remains retarded from international as well as regional standards. While harvesters have been pre-empted by the small size of village farms, even drip irrigation, greenhouse horticulture, latest seeds, and value addition in rural produce through food-processing (for *papad*, *khoya*, *ghee* sweets, etc) are missing. The practice of organic farming has also not found takers, despite subsidy available from the state. In December 2011, I was informed by Pushpender (a prosperous landowner) that for two preceding crops, he and two others experimented with organic manure (developed by releasing worms and water in stored dung or purchased from state outlets at a price of Rs 20 per kg). About 180 kg of such compost is required to cultivate wheat in an acre. Against this, the cost of cultivating a similar field with chemical fertilisers is Rs 2,000. However, the effect of organic manure lasts for two harvests. Thus, its overall cost is less. Yet, most farmers use fertilisers as their application requires less labour and also because compost is difficult to procure with dung as it is being used for making fuel cakes widely in the region.

Costs and Incomes

The principal concern of a farmer is the difference between his cultivation costs and gross earnings. Due to neglect of family planning and a retarded non-farm sector, pressure on land has

Box 2: Yearly Earnings from Two Milch-Bufferaloes in Dhantala in 2014 (Not counting accidental deaths or losses to cattle)

Purchase price of a healthy four-year-old buffalo near first conception: Rs 70,000.
 Expected life of a buffalo: 16 years maximum with first four and last three years being dry.
 Expected yield of milk/day in wet years with conception: 12 litres in two peak months. Eight litres for up to three months; declining for another four months and none for last three months.
 On average about 5 litres milk yield/day in a year expected.
 Price of one litre of high (65%) fat content milk in 2014: Rs 34 per kg.
 Earning from milk sold/ year: Rs 62,000.
 Value of dung sold or used: Rs 15/10 kg/day, or about Rs 4,000/annum.
 Net earnings from calves sold/or reared in 10 years Rs 8,000/annum on average (about seven calves may survive in 14 years; each would be fed about Rs 60,000 as feed in four years and sold for Rs 75,000 approximately at current price, at age four).
 Expense on feed for one buffalo: Rs 120 in milch months and Rs 50/day, in dry months or about Rs 90/day, on average, or Rs 33,00/year in absence of grazing ground.
 Interest paid on investment of Rs 70,000: Rs 8,000 approximately at bank rate of 12% per annum.
 Expense on medication: Rs 4,000/year on average.
 Gross earnings from one buffalo/year: Rs 75,000/year approximately.
 Gross expenditure/ year: Rs 45,000 on one buffalo.
 Net earnings from one buffalo/year: Rs 30,000/per year or about Rs 82 per/day or, Rs 328 from four buffaloes reared by one nuclear family, including the price of milk consumed by concerned family. The earning is thus a little more than the combined wage of a couple from unskilled labour: Rs 400/day for roughly 20 days in a month and about 45% more than the average earning derived from two crops and their side products in an acre.
 A couple can rear up to 10 buffaloes/cows simultaneously without major use of machines. The demand for milk is enough. Poor villagers in Dhantala also take loan and rear up to four cattle. For earnings from cattle farms also see: <http://farmnest.com/forum/animal-farming/project-report-for-10-cowbuffalo-dairy-farm/>

mounted and farms have shrunk. About a quarter of the holdings in the village were marginal or submarginal in 2012. In 2013, the gross value of wheat cultivated with optimum inputs in an acre was Rs 35,000 (including the price of hay—its side-product). With medium category paddy, the optimum yield of 20 quintals per acre sold at Rs 2,500 per quintal generated a return of Rs 50,000 at the most. The operational cost of cultivating wheat and paddy in the same area with optimum inputs was Rs 15,000 and Rs 20,000, respectively.²⁰ Thus, from a combined harvest of wheat and paddy under normal precipitation, a marginal farmer in Dhantala could earn up to Rs 50,000 net or Rs 4,400 per month, on average including returns from side products. Sugar cane cultivation yielded a slightly higher income of up to Rs 5,400 per month.

These estimates are of best yields expected with optimum inputs under normal weather. It is not surprising that resultant incomes are about three times those of averages reported officially for the country as a whole (60% of cultivated area being rain-fed or dry-land in the country). Within Dhantala, general opinion is that average farm yields are not more than two-thirds of the optimums cited above. These averages are, however, comparable to farm incomes and yields reported from irrigated tracts like Punjab and coastal Andhra.²¹

It would be useful here to obtain a rough idea of the change in net income from farming since the late 1930s for which elders have some recollection and by which time the price fall brought by the great depression had been neutralised. Fluctuations in yields were large in early 20th century as irrigation was not developed and even optimum yields (under normal monsoon)

for wheat, millets, etc, were less than four quintals, or one-fifth of the present day. With an average sale price of Rs 6, per quintal, for cereals, reported for the late 1930s, two harvests could bring a net income of approximately Rs 30, per acre (after deducting 60% of the earnings as operational costs and adding 10% as income from side products).²² With the value of two harvests, in 2013, being Rs 47,000, the rise in output from one acre appears to be about 1,500 times, in current prices or, eight times in constant prices, given a rise of 185 times in wholesale price index (from 0.9 in 1935 to 170 in 2013).²³

Side Incomes

Animal husbandry is a close ally of cultivation. In Dhantala too, most cultivators rear buffaloes (but negligible poultry or other livestock) and earn up to Rs 30,000 per annum from one buffalo or net Rs 60,000 from two (not counting extraordinary losses from disease and death among stock). Though one couple can manage up to 10 cattle without machines, 2–4 are common among small farmers. The annual earnings of a marginal farmer from two crops in one acre and from milk drawn from two buffaloes go up to Rs 10,000 per month, in current prices (Table 3 and Box 2). This amounts to a per capita, per day, income of about Rs 66 from cultivation and animal husbandry (in a median family of five) when the national poverty line for the countryside is Rs 32 per day in 2014. In other words, with optimum investments, and normal precipitation a farming household with one acre of land and two buffaloes could be well above the new poverty line. However, as actual incomes from small farms and milk production is only two-thirds of the optimum, or, about Rs 44 per capita, per day, the margin over the poverty line is barely 50%.

Also, we need to remember that farmers' combined earnings from crops and livestock are nowhere near farm incomes in rising Asian economies and remain one hundredth of earnings, per worker, in advanced countries like the United States and Japan (Balakrishnan 2012: 29 and 18). Even within India, maximum income derived by a marginal farmer from cultivation and animal husbandry, in Dhantala, is less than two-thirds of the salary of a regular Grade IV employee in the public sector (who earns at least Rs 15,000 per month on joining). The former has no security against illness, accident and old age too. Ironically, even an unskilled couple earns up to Rs 450

Table 3: Impact of Mechanisation on Time Spent in Various Stages in Cultivation of Wheat on a Small Farm (2.5 acres) between Third Week of November and First Week of April

Process Name	Time Needed with Machines	Time Needed without Machines
First ploughing (two times)	2.5 hours	4 days with 1 labour and 2 bulls
Second ploughing (two times)	2.5 hours	4 days with 1 labour and 2 bulls
First irrigation	15 hours	4 days with 2 labour and 4 bulls
Sowing	2.5 hours	4 days with 2 labour and 2 bulls
Second irrigation with fertiliser	15 hours	4 days with 2 labour and 4 bulls
Weeding	3 hours with pesticide	30 mandays
Third irrigation with fertiliser	12 hours	3 days with 2 labour and 2 bulls
Fourth irrigation with fertiliser	12 hours	3 days with 2 labour and 2 bulls
Harvesting	4 hours	20 mandays
Threshing	6 hours	30 mandays and 2 bulls
Transport	1 day (single round)	2 days/4 rounds with 1 bull

Total farming time spent on 2.5 acres or 1 hectare in rabi season: 85 hours in 15 days now and 122 days before mechanisation. Preparing feed for two buffaloes (besides two hours for washing and feeding, etc): 30 minutes daily, 2.5 hours with hands. Machines here refer to motorised aids like tractors and not ploughs, etc.
 Source: Focus group discussion with six small farmers of Dhantala in October 2014.

Box 3: The Land Law and a Submarginal Dalit Farmer

Bhopal Singh is a Dalit marginal farmer with a field of four acres in Dhantala. Besides farming, he rears two buffaloes for feeding his family of four children and a handicapped wife—Suresh.

Bhopal had borrowed Rs 2 lakh in 2002, for the treatment of his wife (when she lost both her hands in the fodder machine). Even after selling his buffaloes he could neither save Suresh from disability nor his family from mounting debt.

By 2011, he was desperate to sell his field to tide over difficulties. However, because of legal restrictions on sale of agricultural land, he could not find a buyer. It was only in 2014 that he struck a deal with a Dalit buyer who could pay Rs 10 lakh only in instalments, for his field, while the market price was around Rs 20 lakh. Most of the money received by Bhopal was used in repaying debt and purchasing buffaloes, while some are being used to build a pucca house. To make ends meet, Bhopal and his children rear livestock again and were earning about Rs 7,000 per month, with two buffaloes and one cow in July 2014.

a day from farm labour or Rs 9,000 per month, while working for 20 days, in a month, on average.²⁴

Some Paradoxes

In this context, it is not surprising that younger farmers are keen to move out of both agriculture and villages and Dhantala's population has shrunk though at a much slower rate than reported from China and other East Asian economies lately. Hopefully, growth of the non-farm sector and population's decreased dependence on land would make farm sizes more viable in future. Presently, our laws seem to hamper this. Another paradox, in agriculture, is that while farm incomes have not risen as much as salaries and wages in the non-farm sector, the price of land shot up and is one of the highest in the world today (Chakravorty 2013). The oldest land sale remembered by residents of Dhantala is of Lala Kanodi Mal to Gopal Singh (the village *mukhiya*) in the 1930s which fetched Rs 2,000 from the sale of 40 acres of fertile land, that is, Rs 50 per acre. This was a low rate in a distress sale. Family documents in the village show that, in 1968, Sohrab Singh

purchased a ready field of 0.78 acres at a price of Rs 4,000 or, about Rs 5,000 per acre.²⁵ Today, the price of good agricultural land in Dhantala has reached Rs 50 lakh per acre. This implies that even a marginal farmer can be called a millionaire, going by his land's value.

However, land is not easy to sell. Out of 120 beneficiaries of land distribution in 1984 40 had sold their fields by 2006 in Dhantala. With restrictions growing on sale and purchase of farmland, especially of a Dalit, this has become difficult since the passage of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. No doubt, *benami* transactions (under false names) are going on. But a Dalit seller gets only a very low price which is far below the market price (Box 3)

The story of Dhantala shows that soil fertility, 100% irrigation, state subsidies for power and marketing and even decline in land inequity do not make a major dent in small farmers' poverty. The underperformance of the state, especially in providing infrastructure, the class and caste matrix of farming, "governmentality," restrictions on market, rising population and weak community and civil society initiatives have been held responsible for this situation by different ideologues.²⁶ By tracking evidence on the fallout of various macro transitions on agriculturists, in one village, this paper seeks to accord a historical angle to the debate and also underlines underattended facets like the colonial achievement (including the turnaround in nation's death rate from early 20th century), the critical importance of the Green Revolution for the marginal farmer, savings brought by the "grey" revolution in agriculture, the exhaustion of land reform initiatives, underemployment of farmers and the importance of non-farm growth and of population control for future rural prosperity.

NOTES

- 1 The term "small farms" has been used here to focus on small as well as marginal and sub-marginal farms as defined later in the text.
- 2 Long-term studies of Indian villages by Wiser and Wiser (1971) and Himanshu and Stern (2011) have tracked technological developments, but generally lack of details on changing time spans in cultivation since mechanisation and the cost structure of cattle rearing, etc, as attempted in this paper.
- 3 Tehsil and block development records in Dhantala carry errors like the village's area being shown as 2.1 km² in 2011, while it is 5.5 km² (including fields) and 0.25 km² (without fields). On the other hand, the use of group interviews and oral evidence in the field brings forth fairly reliable information on materialities like prices, wages, yield rates, etc.
- 4 Interestingly, census data on Rasoolpur Dhantala shows the village population in 2011 as 2,153 which is a clear undercount as confirmed by the concerned enumerator to me in 2014.
- 5 The term "middle castes" has been used here to refer to "Other Backward Classes" including upper middle castes such as Jats and Gujjars and lower middle castes like Kumhars, Dhimars, etc.
- 6 For example, in the United Provinces, Malcolm Hailey's administration reduced land revenue by about 20% in the 1930s when prices fell by half. But real fall in land revenue demand came

- in the 1940s when prices rose by 100% but demand remained fixed leading to a 75% fall in the incidence of tax, according to Stokes (1984: 83–84). In a detailed study of Vilayatpur in Jalandhar District, T B Kessinger (1979) has shown that the price of agricultural land rose from about Rs 200 per acre in 1880 to Rs 1,200 in 1920s and Rs 5,000 by 1968. Land revenue and rentals in early 20th century in Dhantala has been given later in the text.
- 7 Randhawa (1983: 367) mentions land rentals in the range of Rs 5 and Rs 15 per acre, in United Provinces in the 1920s.
- 8 Throughout this paper, the measure of agricultural land used is in acre, while locals generally use measure *kacha bigha* and *pucca bigha*. *Kachha bigha* is equal to 1,000 square yards, that is, approximately equivalent to one-fifth of an acre. *Pucca bigha* is roughly one-third of an acre. One hectare is equal to 2.47 acres.
- 9 See Gupta (1998) and Gupta (2005). For my analysis of perspectives on underdevelopment, see Vijay (2013, 2014).
- 10 *Vikas Pustika* for 2011 available at the block development office (BDO), Kharkauda (Meerut District) lists village-wise data for 39 villages in Kharkauda block. Its count of families and population matches our data for 2006 on population, number of families, etc, but not on number of tube wells, workers and farmers in the village. Conversation with the assistant

development officer revealed that the booklet undercounts such assets in Dhantala.

- 11 The average agricultural holding in Uttar Pradesh, in 2011, was 0.8 ha or two acres which was half of the average holding in Punjab even as the required land for an economical or viable family field was estimated at 0.5 ha in Punjab and two hectares in MoA (2012).
- 12 The term small farms has been used here to focus on small as well as marginal and sub-marginal farms.
- 13 In one day (in six hours before noon), one farmer can plough six acres twice with a tractor. Since a farmer has about 20 days for four ploughing before sowing, he can manage up to 60 acres through family labour alone.
- 14 Grain yield of 538 pounds or 2.5 quintals per acre in 1925–26 in Thane District has been cited by Guha (1992). Habib (1984) has also suggested that yields may not have changed much over the early modern era and roughly 12 *Akbari Maunds* per *bigha-i-Ilahi* (or about three quintals per acre) was average yield for wheat in Delhi–Agra region as per Ain-i Akbari. In recent times, Dreze et al (1998) and Himanshu and Stern (2011) have reported a jump in wheat output, in Palanpur, from 2.2 quintals in 1957–62 to about six quintals in 1974. But Tyagi's detailed study of Wahidpur (in Meerut District) showed a rise, in average yield, from six quintals per acre to 12 between 1963 and 1983 in the wake of the Green Revolution (1988).

- 15 The 1950s was a decade of major reforms and a period of incubation for the Green Revolution that burst in the next decade. Sale of chemical fertiliser is said to have increased from three lakh tonnes to three million tonnes between 1961 and 1981 (Randhawa 1986: 309–10).
- 16 An early high-yielding wheat developed by the Pusa Institute in the 1920s (called Pusa 4) also yielded 14 quintals per acre but suffered fungal/rust infections (Randhawa 1983: 44).
- 17 For the impact of the green revolution on small farmers see Bhalla and Chadha (1982) and for growth in the non-farm sector in the wake of the Green Revolution see Randhawa (1986: 652–59).
- 18 See Table 3. The amount of Rs 5,000 assigned to cost of “family labour” in wheat cultivation in Commission for Agricultural Costs and Prices tables, for UP, in 2010–11, is consonant with our calculation of low labour time required in fields due to mechanisation. However, the free time of the underemployed small farmer through the day needs to be utilised and counted in labour costs.
- 19 Sen and Bhatia (2004: 40 and 235) note that mechanisation may have played a role in maintaining higher profitability in agriculture despite decelerating growth in yields in the late 1990s and early 2000s.
- 20 Costs, in present analysis, have been counted on successive processes like ploughing, irrigation and fertilisers, etc. These can be clubbed into categories like human labour and machine labour as used in CACP tables. According to the latter, for example, the variable component of operational costs (or paid out costs and value of family labour) forms about 60% of total costs. The former include human labour (33%), bullock and machine labour (21%) and seed, water and fertiliser charges at about 15% each of the average costs, in Uttar Pradesh, in 2011–12 (CACP 2013).
- 21 Dev (2012). It is noteworthy that the price of coarse paddy is less than two-thirds of the medium variety grown in Dhantala. The latter fell from Rs 2,500 to Rs 1,500 in 2015.
- 22 Prices slid back to 1914 levels by 1933 before recovering to pre-depression levels by 1940. Thus, in 1928, the price of wheat reported in the United Provinces was Rs 6 per quintal approximately, while daily wage of unskilled worker was six annas. These had fallen to Rs 4

- for former and four annas for latter by 1933, before recovering back by 1940. In 1940, superior quality wheat (like C 591) was selling at Rs 10 per quintal, while coarser variety was priced at Rs 6 (Randhawa 1983: 345 and 355). It is notable that one anna before 1966 comprised four paise and not six and similarly one rupee equalled 66 paise and not 100.
- 23 TIS (2013: 235). In the absence of serial data on consumer price index for agricultural labour from early 20th century, this study has used the available data on wholesale price index. See: http://labourbureau.nic.in/CPI_ALRL_2011_12.pdf as on 31 October 2014 and TIS op cit.
- 24 On rise in real wages since the 1990s see Sundaram and Tendulkar (2005).
- 25 *Bainama* (sale agreement) dated 5 February 1968, personal papers, Devraj Singh, Dhantala.
- 26 For a detailed policy comment on agriculture's potential today see Swaminathan (2003).

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