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ECONOMICS 301Y1

The Economic History of Later-Medieval and Early-Modern Europe

LECTURE TOPIC NO. 7: part 2

IV. LATE-MEDIEVAL AGRICULTURE: Changes in Later Medieval Agrarian European Society, from c. 1300 - c. 1520

B. Mediterranean Agriculture: the Agrarian Responses to the Late-Medieval Crises in Italy, Southern France, and Spain

C. Northern Agriculture: Agrarian Changes in the Late-Medieval Low Countries and Northern France (Artois and Picardy):

IV. LATE-MEDIEVAL AGRICULTURE: Changes in Later Medieval Agrarian Society, in Europe, West and East, from c. 1300 - c. 1520

B. Mediterranean Agriculture: the Agrarian Responses to the Late-Medieval Crises in Italy, Southern France and Spain

1. Agrarian Changes in Late-Medieval and Renaissance Europe

a) **The Objectives and Outcomes of Agrarian Changes:**

i) **The chief consequences of agrarian changes, of increased agricultural efficiency and productivity:**

(1) was paradoxically to reduce the size and scope of the agrarian sector, in order to liberate labour, capital, and resources.

(2) Thus to transfer those resources elsewhere in the economy where they could be employed more productively, especially in industry and commerce.

(3) If these were ultimate consequences, they were not necessarily the original goals, as we shall see.

ii) **That also meant:** liberating agricultural and rural society from any remaining bonds of feudal institutions, of manorialism and serfdom.

iii) **That was far easier to do in southern Mediterranean Europe,** and also in the northern Low Countries, than it was in northern France, England, and Germany

b) **Increasing agricultural productivity meant**:

i) **increasing output per acre [or hectare = 2.47 acres] and per man:** increasing both productivity of land and of labour (and also of capital).

ii) **That was achieved far more by reorganizing land tenures and the use of land,**

(1) by growing new crops, and by improving agricultural techniques,

(2) especially those cultivation techniques that were designed to reduce the amount of land lying fallow.

iii) **That was a very slow and gradual process in later-medieval and early-modern Europe,** generally more successful in northern than in southern Europe.

iv) **Virtually none of those objectives was achieved by any mechanical devices (other than improved ploughs),** certainly not by any powered machinery, before the 19th century.

c) **Increasing Agricultural Productivity had these specific objectives**:

i) **to liberate labour from the soil**: to be employed more productively in other sectors of the economy, especially urban sectors: trade, finance, and manufacturing industry (though much of the last was still rural).

ii) **to supply increasing foodstuffs to permit growth of urban populations**: and those of the economic sectors with urban settings

iii) **to supply more industrial raw materials**: especially for the textile industries, which were then the major manufacturing industries.

iv) **to supply capital (from agrarian rents and profits)**: to be invested more productively in other sectors of the economy

v) **to increase rural market demand for manufactured goods**: when the rural economy provided generally still the largest market.

vi) **In general to promote population growth**: by feeding more people.

d) **Changes in late-medieval European agriculture, north and south:**

i) **We shall begin with southern, Mediterranean Europe,** and with Italy in particular; and then

ii) **we shall go to northern Europe,** beginning with the most advanced region of the North: the Low Countries, and then on to England (next week).

iii) **In all cases we want to discern specific agrarian response to demographic changes:**

(1) in altering the land:labour ratio and affecting the marginal productivity of both

(2) in producing or leading to relative-price changes, and those to discern the responses to those changes in relative prices.

2. Late-Medieval Italy: Grain Farming

a) **The predominant forms of commercial agriculture in Italy (including Sicily):**

i) **grains:**

(1) for much of this Italy, and especially the island of Sicily, arable farming was almost entirely in the form of winter wheat;

(2) under a two-field system of dry farming, wheat cultivation had long been predominant, especially in peasant agriculture.

ii) **livestock:** migratory agriculture

(1) but parts of Italy had also engaged in some considerable pastoral farming, for sheep and cattle, above all.

(2) But livestock raising in Mediterranean Europe was not integrated generally with arable agriculture, as it was in the North

(3) livestock raising was more oriented towards migratory herding: flocks of sheep or herds of cattle that roamed large areas to graze on sparse grasslands.

(4) i.e., the problem was an insufficient supply of fodder crops in most such regions

iii) **other non-arable:**

(1) vineyard and olive groves: very capital intensive forms of farming

(2) for which some regions were better suited to these capital-intensive forms of agriculture.

b) **The Behaviour of Wheat Prices:**

i) **We now wish to see if changes in wheat prices promoted shifts to other forms of agriculture:**

(1) particularly in terms of other, non-grain forms of arable crops

(2) and also in terms of livestock and other non-arable forms of agriculture

ii) **Unfortunately we just do not have for Italy,** or the Mediterranean in general, the quantity or quality of agricultural prices that we have for north-western Europe;

iii) **but in medieval economic history,** beggars cannot be choosers -- and so we deal with the data that we do have.

iv) **for the Pistoia region of Tuscany, as the table on the screen suggests,** grain prices when measured in stable, unvarying gold currency (the Florentine florin of 24 carats), were -- as in England -- falling before the Black Death:

Prices of a Staio of Wheat at Pistoia, Tuscany

1201-25 to 1427

Mean of 1201-25 in Gold Prices = 100

Quarter Century Period	Gold Price Index: based on the florin
1201-25	100
1276-1300	204
1301-25	170
1326-50	125
1351-75	146
1376-1400	150
1401-25	134
1427 (one year only)	67

1 Staiao of wheat = 25.92 litres or 0.73 bushel

Source: David Herlihy, *Medieval and Renaissance Pistoia* (New Haven: Yale University Press, 1967), p. 123

A much more recent and far better series, expressing wheat prices both in the silver-based money of account (in soldi da lira de piccioli) and in gold florins follows:

Prices of Grain (Wheat) in Florence

in soldi piccioli per staio of grain and in gold florins
1 staio = 25.92 litres = 0.73 bushels

in quinquennial means: 1306-10 to 1496-1500

Index Numbers: mean of 1451 - 75 = 100

Year quinquennial mean	Price in soldi base mean = 19.926 s.	Soldi Price Index Numbers 1451-75 = 100	Value of Florin in soldi	Grain Price in Florins base mean = 0.208 florins	Price of 100 staio in florins	Florin Price Index Numbers 1451-75 = 100
1309-10	9.500	47.677	58.667	0.162	16.193	77.776
1311-15	13.000	65.243	58.533	0.222	22.194	106.600
1316-20	11.033	55.373	58.000	0.190	19.023	91.368
1321-25	13.383	67.165	65.500	0.204	20.432	98.136
1326-30	19.300	96.859	65.500	0.295	29.465	141.523
1331-35	15.633	78.456	60.900	0.258	25.780	123.823

Year quinquennial mean	Price in soldi base mean = 19.926 s.	Soldi Price Index Numbers 1451-75 = 100	Value of Florin in soldi	Grain Price in Florins base mean = 0.208 florins	Price of 100 staio in florins	Florin Price Index Numbers 1451-75 = 100
1336-40	16.675	83.685	59.500	0.280	28.025	134.604
1341-45	17.016	85.399	60.000	0.284	28.364	136.235
1346-50	21.400	107.398	60.400	0.355	35.498	170.498
1351-55	27.000	135.503	62.000	0.435	43.548	209.163
1356-60	14.557	73.056	62.000	0.235	23.479	112.769
1361-65	14.399	72.266	62.000	0.232	23.225	111.550
1366-70	22.866	114.759	66.600	0.346	34.553	165.960
1371-75	28.825	144.661	65.166	0.442	44.233	212.450
1376-60	18.340	92.042	65.166	0.281	28.144	135.174
1381-85	29.100	146.043	65.166	0.447	44.655	214.480
1386-90	33.267	166.954	67.350	0.493	49.342	236.993
1391-95	28.833	144.704	76.084	0.379	37.897	182.018
1396-1400	25.133	126.135	76.084	0.330	33.033	158.661
1401-05	20.667	103.719	76.400	0.270	27.050	129.920
1406-10	23.167	116.266	76.500	0.303	30.283	145.451
1411-15	24.850	124.714	76.500	0.325	32.484	156.020
1416-20	24.600	123.459	79.300	0.310	31.047	149.122
1421-25	16.600	83.310	80.150	0.207	20.717	99.507
1426-30	13.000	65.243	80.750	0.161	16.099	77.324
1431-35	21.200	106.396	80.750	0.263	26.254	126.098
1436-40	22.400	112.418	80.750	0.277	27.740	133.236
1441-45	20.300	101.879	80.750	0.251	25.139	120.745
1446-50	15.800	79.295	80.750	0.196	19.567	93.979

Year quinquennial mean	Price in soldi base mean = 19.926 s.	Soldi Price Index Numbers 1451-75 = 100	Value of Florin in soldi	Grain Price in Florins base mean = 0.208 florins	Price of 100 staio in florins	Florin Price Index Numbers 1451-75 = 100
1451-55	19.100	95.857	80.750	0.237	23.653	113.607
1456-60	21.000	105.392	80.750	0.260	26.006	124.909
1461-65	18.200	91.340	108.800	0.167	16.714	80.279
1466-70	18.748	94.090	109.000	0.172	17.200	82.612
1471-75	22.580	113.322	110.000	0.205	20.527	98.593
1476-80	24.374	122.325	110.000	0.222	22.158	106.426
1481-85	28.458	142.821	120.000	0.237	23.715	113.904
1486-90	23.378	117.326	123.800	0.189	18.930	90.920
1491-95	20.716	103.967	130.000	0.159	15.935	76.538
1496-1500	38.588	193.660	130.000	0.297	29.683	142.569

Source:

Sergio Tognetti, 'Prezzi e salari nella Firenze tardomedievale: un profilo', *Archivio storico italiano*, 153: 564 (1995), 263-333: Table A1, pp. 317-18.

v) **After the Black Death, these Italian wheat prices rose strongly,** apart from a very brief, very-short term fall: just as they did in both England and Flanders.

vi) **For Italy in particular,** those rising prices represent some combination physical disruptions of production and supply and also price inflation;

(1) for as Herlihy aptly remarked, 'men were dying but coins were not',

(2) so that per capita coin supplies increased (or the money supply contracted far less than did the net national product, y).

vii) **Perhaps even more disruptive than the plague was the constant, chronic warfare:** with wars between all the various Italian states, foreign invasions (intervening in the Italian wars), and pillaging by unpaid bands of mercenary soldiers known as 'free companies'.

viii) **Wheat prices were falling sharply, however, by the beginning of the 15th century,** as was also the case in north-west Europe.

ix) **Why were wheat prices now falling?:**

(1) **Supply and Demand:** evidently production and supplies had recovered and achieved some new equilibrium, but probably in excess of market demand: i.e. the supply of wheat placed for sale on the

market had contracted less than the aggregate demand for wheat

(2) **Cost and Supply Factors:** if wheat production had contracted (in Italy and elsewhere), the contraction may have meant:

- that high cost marginal lands were abandoned; and
- thus that wheat was being produced on lands whose average costs were lower

(3) and thus with a generally inelastic demand for wheat, at high prices, wheat prices fell: and fell sharply by 1427, if we can believe the price quoted for Pistoia in the famous Florentine tax registers, known as the Catasto.

x) **According to Harry Miskimin, Italian grain farming,** and especially Sicilian wheat production, suffered particular damage, by the early 15th century, from growing imports of northern, Baltic grain brought into Italy on board German Hanseatic cargo boats.[1]

c) **Rising Real Wages:**[2]

i) **At the same time, as elsewhere in Europe,** the combination of labour shortages and, finally, cheaper grains and thus bread prices, meant rising real wages and living standards for the lower and middle classes of Italian society.

ii) The evidence for rising real wages for building craftsmen (master masons) in Florence can be seen in the graph, and the table in the Appendix

(1) the real wage here is expressed in the quantity of wheat – in the number of staio (25.92 litres = 0.7 bushels

(2) This is a less satisfactory method than using the Phelps Brown & Hopkins basket of consumables composite price index (or number of baskets purchased with the daily wage)

(3) Note from the graph that the rise in real wages immediately after the Black Death was very brief, and that the aftermath of the Black Death, was falling real wages, until almost the end of the fourteenth century

(3) Only in the 15th century do we find a pronounced rise in real wages – though periodically offset by sharp spikes in grain prices.

ii) **Rise in real wages in the 15th century, from:**

(1) combination of nominal money-wage stickiness (that wages did not fall) with falling price levels, in particular falling prices for foodstuffs, especially (here) wheat

(2) possibly increasing labour productivity: if a higher MRP (marginal revenue product) of Labour, then real wages would correspondingly rise

iii) **Effects of changes in grain prices and real wages on consumption:**

(1) **Engels Law on real incomes and food consumption:**

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[1] See Harry Miskimin, *The Economy of Early Renaissance Europe, 1300 - 1460* (1969; reissued Cambridge UP, 1977).

[2] Rising real wages are indicated, from the 1390s through much of the 15th century, in Paolo Malanima's set of prices and wage data, available as a PDF file, which, however, is not usable (i.e., for conversion into a proper table and graph):
htttp://www.economics.utoronto.ca/munro/MalanimaItalyPricesWages

- the income elasticity of demand for grain is low, at least at low prices, so that, as real incomes rise, people spend proportionately less of their incomes on bread
- and proportionately more on higher-quality foodstuffs and other consumer goods.

(2) Much evidence indicates (again as elsewhere in late-medieval Europe),

- that Italians chose to spend proportionately more of their rising real incomes on non-grain foodstuffs:
- especially meat, olive oil (more than butter), cheese, wine, citrus fruits, and sugar; and also more spent on textiles, both wool- and linen-based textiles.

3. Late-Medieval Italy: Agrarian Responses to Falling Wheat Prices and Rising Real Incomes in the 15th century

a) **The shift away from grain production:**

i) **The obvious response, by those who were able to make any such response,** was obviously a relative shift away from a strong emphasis on wheat farming and a diversification into those forms of agriculture that could support and supply these proportional shifts in demand:

ii) **some 15th century examples:**

(1) much more viniculture to produce wines;

(2) olive orchards to produce olive oil; citrus orchards;

(3) sugar cultivation; rice cultivation;

(4) flax cultivation for linen (especially for cotton-linen fustians, a major Italian industry);

(5) silkworm cultivation in growing mulberry bushes, i.e., to produce raw silk for weaving.

(6) livestock raising, for meat, cheese, wool, and leather;

b) **The Case of Sicily:**

i) **Sicily had long been the granary,** the chief wheat supplier, for both the Roman Empire and or much of medieval Italy;

ii) **it suffered the most severely** from the slump in grain prices during the 15th century.

iii) **Significant agrarian advances towards greater diversification were made in Sicily,** and also in southern Italy,

(1) in sugar cultivation, which had been an Arabic or Muslim import

(2) and also in viniculture: in wine production.

iv) **foreign competition, however, subsequently injured these Sicilian attempts at agricultural diversification, from the mid-fifteenth century:**

(1) the Portuguese, who inaugurated European overseas explorations, colonization, and conquests:

- had achieved their first major conquest in the 1430s by seizing and colonizing the Atlantic islands of Madeira and the Azores:
- on which they established both sugar plantations and vineyards (Madeira wines) that were more efficient than the Italian.

(2) Southern France and Spain also responded by increasing wine production.

c) **Northern Italian Agriculture: Tuscany and Lombardy**

i) **the North, especially Tuscany and Lombardy,** in sharp contrast to the worsening plight of Sicily and southern Italy, seem to have prospered with a flourishing agriculture, from the second quarter of the 15th century.

ii) **In Tuscany, recovery of prosperity may have been based on demographic growth:**

(1) Florence:

- population had fallen from about 60,000 in 1373 to a low of 37,225 in 1427
- then recovered to about 42,000 in 1488, and to about 70,000 in 1526

(2) the rural population of the Pistoia region in Tuscany (north of Florence): grew from about 12,000 in 1427 to over 30,000 by 1569.

(3) We cannot, however, document when the demographic turning point took place: but probably in the 1440s or 1450s.

iii) **Agricultural prosperity in northern Italy during the 15th and early 16th centuries:**

(1) was based on urban demographic recoveries and very buoyant urban economies based on foreign trade, finance, and industry,

(2) and at a time when northern Italy was at its height in dominating European international commerce and finance.

iv) **Thus urban prosperity and strong urban demand for both foodstuffs and industrial raw materials:**

(1) intensified the scope of commercialized agriculture in their rural hinterlands;

(2) promoted investment and productivity growth in these forms of agriculture.

v) **In Lombardy, in the Po Valley region especially,**

(1) the urban communal governments, and also the large landowners, including feudal nobility, began investing extensively in agriculture,

(2) by building canals, draining and irrigating the lower Lombard plain.

vi) **Land reclamation was nothing new,**

(1) but was especially impressive in the 15th century, in reclaiming large areas of swampland and marsh in the lower Po Valley

(2) and converting them into very rich farmlands that became one of the most scientifically advanced agrarian zones in Renaissance Europe.

vii) **Canals and irrigation:**

(1) between 1439 and 1475, in what had become the duchy of Milan (in Lombardy),

- under first the Visconti and then, from 1450, the Sforza ducal regimes,
- almost 100 km of navigable canals with complicated locks, were constructed in the Po Valley south of Milan.

(2) These canals were designed to supply numerous waterways and ditches with irrigation for reclaimed farmlands in lowland Lombardy.

viii) **Extensive growth of more specialized crops:**

(1) mulberry cultivation: for sericulture, i.e., to feed and host silkworms, for raw silk

(2) rice: very significant expansion of this growing alternative to wheat (& other cereals)

(3) extensive cultivation of fodder crops to increase the size of livestock herds (chiefly cattle and sheep).
(4) crops for textiles: flax (linens), dyestuffs plants (woad and madder)

4. **<u>Italy and Southern France: Changes in Peasant Tenancies and Landholding in Response to the Agrarian Changes</u>**

a) **All of these new forms of farming were very capital intensive:**
i) **much capital was invested in livestock herds,** in orchards, vineyards, sugar plantations, irrigation systems, fertilizers, etc., with a much longer return on capital than was true of wheat farming.
ii) **But very few peasants had access to capital:** to funds that would allow them to engage in these new forms of agriculture.
iii) **even in traditional wheat farming,** more and more peasants were becoming indebted to urban merchants, especially when wheat prices fell and their labour costs rose.
b) **The urban bourgeoisie and purchases of rural land:**
i) **At the same time, given the much higher level of urbanization in Italy than in northern Europe,** many of the urban bourgeoisie, especially merchants and financiers, were themselves diversifying by buying up land;
ii) **especially small manors or seigniories of feudal lords,** or lands of peasant freeholders, who had fallen onto hard times (or were bankrupted by constant warfare);
iii) **they adopted more profit-oriented forms of landholding:** those that would benefit both themselves and peasant tenants.
c) **Reactions of Feudal Landlords to such changes:**
i) **Other and more successful feudal landlords,**
(1) even if they had never been able to impose on their peasant tenants the types of bondage that had been found in the north (or east),
(2) nevertheless were also compelled to improve the conditions of peasant tenure in order to keep tenants on their land;
ii) **then, as more and more vacated lands became available,** or as peasants were attracted on to lands purchased by bourgeois investors or were attracted into urban crafts, the pressures for changing the forms of land tenure and land organization mounted, resulting in the spread of:
d) **Mezzadria: Peasant Sharecropping**
i) **Sharecropping, known as *mezzadria* in Italy and *métayage* in southern France,**
(1) was the new system of peasant farming that emerged during the demographic and agrarian crises of the 14th century,
(2) particularly with wide fluctuations in agricultural prices (i.e., thus before the 15th century decline in grain prices)
ii) **Although share-cropping has generally an odious name,** because of American experiences earlier in the past century (20th), it is by no means intrinsically bad and was in fact generally beneficial to the peasants who chose this form of land-holding.
iii) **Peasant rent:** was in effect determined by the peasant's ability to pay.

(1) Instead of paying a fixed money rent or a fixed quantity of agricultural produce, the peasant tenant instead delivered one-half of his harvest to the landlord.
(2) While that may seem excessive, it was far better than having to pay a fixed money rent after grain or oil prices had crashed, or having to pay a stipulated amount of grain, oil, or wine, when the harvest had failed.
(3) Thus the risk was shared between landlord and tenant,
(4) and, for the landlord, this was achieved with relatively low monitoring costs (to avoid or prevent shirking).
iv) **The landlord in return supplied all of the necessary capital:** both fixed and working capital, including seeds, trees, tools, etc.
v) **Capital was obviously the chief consideration in this new system of farming:**
(1) for the *mezzadria* system largely spread in the more capital intensive forms of farming, such as viticulture (wines), olive oil, citrus-fruit orchards, livestock, silkworm cultivation (mulberry bushes);
(2) and the only way that peasants could get the capital for such forms of more productive and diversified agriculture was through the *mezzadria*.
vi) **The following table shows the rapid 14th-century growth of *mezzadria* leases in the Pistoia region of Tuscany:**

Mezzadria Lease Contracts in Pistoia, 1300-1425

Quarter-Century Period	**Proportion of Agricultural Leases in the form of Mezzadria Contracts**
1301-25	5.6%
1326-50	45.7%
1351-75	55.0%
1376-00	54.7%
1401-25	66.7%

Source: David Herlihy, *Medieval and Renaissance Pistoia* (1967), p. 127.

vi) **Precisely the same was true of southern France:** with the spread of *métayage*,
(1) but only in those regions south of the Loire River;
(2) principally in non-grain forms of agriculture (and especially in vineyards and olive groves)
vii) **Note that this system of share-cropping can be found only in non-communal forms of farming,** in which peasants cultivated individual plots, in severalty (to use the legal term).

e) **The Census: the Perpetual Rent on Peasant Land (also known as *rentes*)** [3]

i) **This financial innovation,** to be discussed later under banking and finance, provided another way in which small peasants could acquire capital.

ii) **The term census is derived from the older Latin word,** expressed in French as *cens*, which meant an annual payment, usually in coined money, that relieved the peasant of any other obligations to his landlord; and for that reason was often called 'quitrent'.

ii) **By the census, an urban merchant invested in a peasant farm:**

(1) by supplying that peasant with an initial lump sum of capital investment, in, say, gold florins;

(2) and receiving in return a perpetual annual rent income, either in money (as a form of cash rent), or a specified quantity of agricultural produce (i.e., a rental payment in wheat, oil, wine)

iii) **The merchant's investment in that land was never redeemed or paid back by the peasant:**

(1) The only way in which the merchant could regain his capital was by selling his census to a third party.

(2) The modern analogy would be in buying stock in a corporation, e.g. BCE.

5. **<u>Agrarian Changes in Late-Medieval Spain</u>:**

a) **Spanish economic history is vastly complicated by those political processes known as the 'Reconquista':**

i) **the reconquest of once predominantly Muslim Spain:** earlier conquered by Muslim Arabs and Berbers from North Africa, from the 8th century and reconquered by the Christian kingdoms of Castile and Aragon (and also Portugal)

ii) **by the later 15th century, only one Muslim emirate was left in Spain:** Granada, which fell to Christian Castile in the very year that Columbus sailed across the Atlantic, 1492.

b) **One of Christian's Spain great assets was its Muslim heritage:**

i) **Muslim agriculture in medieval Spain:** had been more advanced than any found in Christian Europe,

ii) **with extensive irrigation, and a widely diversified agriculture,** especially with specialized cash crops.

iii) **on the other hand, Muslim agriculture in the Mediterranean basin:**

(1) had not adopted any of the European modes of agriculture, especially mixed farming with animal husbandry

(2) possibly, however, for the same reason that this system was not practised widely in Christian lands of the south: namely, the greater difficulties and costs in feeding livestock.

c) **Perhaps Christian Spain's greatest deficiency was the Reconquista itself,** which promoted a militaristic feudalism at the expense of peasant agriculture and economic development.

d) **Agrarian diversification:**

i) **Nevertheless Spanish agriculture, especially those more southerly regions,** such as Valencia and

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[3] See John Munro, 'The Medieval Origins of the Financial Revolution: Usury, *Rentes*, and Negotiablity', *The International History Review*, 25:3 (September 2003), 505-62.

Granada, which had benefited from its Muslim heritage, did respond to the late-medieval agrarian crises, especially in grain farming, in ways very similar to those of Italy:

ii) **especially by diversifying into other crops, which were either basically new or previously underdeveloped:** e.g., sugar, rice, cotton, citrus and other orchard fruits, figs, dates, almonds

ii) **also,** in greatly expanded sheep raising and wool production, but with migratory flocks

e) **Spanish wool production: and the emergence of *merino* wools**

i) **Formation of the Mesta:**

(1) In the Iberian peninsula, sheep-raising was necessarily migratory to feed the flocks: who wandered over large areas with sparse grasslands

(2) In Spanish (Castilian) sheep raising, the major event had occurred in the previous century, in 1273, with the royal Castilian establishment of an official organization of sheep-farmers called the Mesta.

ii) **The Mesta organization was given powers over land use at the expense of arable-crop and peasant farmers:** particularly for the annual migrations of the sheep from the higher central plateau regions of northern Castile to the southern Lowlands, known as transhumance.

iii) **They had to be given monopoly rights of way along these transhumance routes,** even at the expense of arable crops.

iv) **Many historians believe, wrongly, in my view,** that the Mesta marks the beginning of Spain's future economic prosperity in wool exports

v) **That future prosperity depended upon a specific and new breed,** or crossbreed of sheep, called the *merino*, which came to produce the world's finest wools (and whose descendants in Australia still today produce the world's finest wools);

vi) **but when the Mesta was established,** there were no merino sheep in Spain,

(1) and Spanish wools were then amongst the very worst in western Europe,

(2) fit only for domestic consumption and production in cheap, coarse woollens.

vii) **Origins of the term *merino* and of the sheep producing this wool:**

(1) the word comes the name of North African Berber tribal group, the Marinids, who, in the 13th century, created a powerful and most aggressive empire in western North Africa

(2) They expanded eastwards to conquer neighbouring Arab states (in what is now Morocco, Algeria, and part of Tunisia)

(3) In 1291: they crossed the Straits of Gibraltar to invade Spain: Castile, Aragon, and also Muslim lands: conquering the Muslim emirates still left in southern Spain, except for Granada

(4) Battle of River Salado, 1340: Finally the Christian kingdoms of Castile and Aragon, with Muslim allies, defeated the Marinids once and for all in 1340.

vi) **Origins of Merino Sheep: according to Roberto Lopez:** [4]

(1) not until after this Battle and the ensuing peace were North African merinid sheep introduced into

[4] See Robert Lopez, 'The Origin of the Merino Sheep', *The Joshua Starr Memorial Volume: Studies in History and Philology* (a publication of Jewish Social Studies no. 5, New York, 1953), pp. 161-68.

Christian Spain, evidently to be cross-bred with other sheep;

(2) from my own research I can attest that not until the very late 14th century were Spanish merino wools, genuine merino wools, being exported; and at first principally to Italian (especially Florentine) woollen cloth industries.[5]

vii) **In the 15th century,** Spanish merino wool exports:

(1) began to make serious inroads into those markets that had long been served by English wools,

(2) for English wools had long been indisputably the finest in the world (and many brands of English wools would still remain superior to merino wools until the 16th century.

viii) **The very striking improvement in the quality of Spanish merino wools from the late 14th to 16th centuries remains a mystery:**

(1) but it seems to have as much to do with better sheep management and proper feeding,

(2) and with the annual transhumance sheep migrations, as with cross breeding.

(3) By the mid-16th century, Spanish *merino* wools were rivalling in quality and price all but the very best and finest English wools (from the western Midlands near Wales).

(4) More on this matter of international competition in wools when we come to English agrarian changes, and the cloth industries in both England and the Low Countries.

[5] See John Munro, 'Spanish *Merino* Wools and the *Nouvelles Draperies*: an Industrial Transformation in the Late-Medieval Low Countries', *Economic History Review*, 2nd ser., 58:3 (August 2005), 431-84; John Munro, 'The 'Industrial Crisis' of the English Textile Towns, 1290 - 1330', *Thirteenth-Century England:* VII, ed. Michael Prestwich, Richard Britnell, and Robin Frame (Woodbridge, UK: Boydell Academic Press, 1999), pp. 103-41; *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442 (Aldershot, 1994); John Munro, 'Medieval Woollens: Textiles, Textile Technology, and Industrial Organisation, c. 800 - 1500', in David Jenkins, ed., *The Cambridge History of Western Textiles* (Cambridge and New York: Cambridge University Press, 2003), chapter 4, pp. 181-227.

C. Northern Agriculture: Agrarian Changes in the Late-Medieval Low Countries and northern France (Artois and Picardy): [6]

1. **Agricultural change and development in northern Europe**

a) **Ultimately agrarian changes in north-west Europe:**

i) **would prove to be far more important:** for economic development and the foundations of modern industrialization than anywhere else in Europe,

ii) **apart from such islands of southern agrarian prosperity,** and sophistication, that one could find in, say, the Po Valley of Lombardy, in northern Italy.

b) **In north-west Europe,** the regions that underwent the most dramatic and fundamentally important changes were the Low Countries (and the adjacent, bordering regions of northern France that had once politically been members of the Low Countries), and England

2. The Agricultural Precocity of the Low Countries: Flemish and Dutch Agriculture

a) **The Low Countries, comprise the modern-day Benelux countries of the Netherlands, Belgium, and Luxembourg:**

i) **this region was the most economically advanced zone in northern Europe from the 11th or 12th centuries:**

(1) and it would remain the leading and pivotal zone of the northern economy until the 18th century,

(2) when finally displaced by Great Britain, when Britain was undergoing an Industrial Revolution and had defeated Napoleonic France (which had conquered the Netherlands in 1793).

ii) **Because of this region's overall economic importance in general,** and its particular importance in generating agricultural advancements, we must consider its historical background.

b) **some historical geography and political history**:

i) **In late-medieval Europe,** the Low Countries consisted of about 20 different feudal principalities (including bishoprics); most of them owed allegiance to the Emperor of the German Habsburg Empire, sometimes called the Holy Roman Empire.

ii) **the coastal county of Flanders, on the North Sea, was the single-most important principality:**

(1) Its feudal overlord was not the German Emperor but the King of France.

(2) At the end of the 13th century (1296-97), Flanders, as the most economically advanced part of France but economically more closely tied to England, had revolted against French rule:

- when forced to choose between England and France (who were chronically at war with each other).
- The Count of Flanders, supported by the urban craft guilds, had defied the King of France, who was supported by the mercantile governments of the French towns, who feared the Count's power

[6] Note: time constraints do not permit the oral delivery of this lecture, which therefore is offered as an extra lecture to be read (if not heard).

and looked to the king for protection: very complicated.]

(3) In the year 1302, in one of the greatest military and political upsets in medieval history -- the Battle of the Golden Spurs (at Courtrai or Kortrijk) a Flemish army composed chiefly of urban crafts-guild militia, armed with pikes and bows, defeated the very flower of the French cavalry; and that striking victory seemed to gain Flanders its independence

(4) But the French resumed the war and ultimately defeated Flanders, by 1320, forcing Flanders to yield its French speaking towns (Lille and Douai, then the leading cloth-making towns) to the French king and to pay a heavy indemnity, as the price for retaining quasi independence from France.

(5) Thereafter an uneasy coalition of the Count of Flanders and the three leading towns (Bruges, Ghent, and Ypres) ruled the county of Flanders together, with the towns pre-eminent..

(6) In 1384, the last Flemish count (Louis de Male) died, leaving only a daughter as an heir, one married to a very powerful French duke, brother of the king, the duke of Burgundy;

(7) and the duke of Burgundy became the true ruler of Flanders (regarding it as far more important than his home duchy of Burgundy, in the SW of France).

(8) Subsequently, through marriage alliances, and through other means fair and foul, the dukes of Burgundy expanded their power and then ownership over neighbouring principalities in the Low Countries, which found no support from the far distant Habsburg Emperor.

(9) By the 1430s, the dukes of Burgundy had acquired the counties of Holland, Zealand, and Hainaut (which had all had one ruler), the duchy of Brabant, the county of Namur, etc: thus creating the very powerful Burgundian Low Countries, as a rival to France.

(10) Indeed, during the later phases of the Hundred Years' War, from 1419 to 1436, the dukes of Burgundy allied again with England against the king of France; and it was the Burgundians who burnt Joan of Arc at the stake.

(11) In 1477, the last duke of Burgundy (Charles the Rash) died in battle, at the hands of a Swiss army, in a vain attempt to create a vast empire around eastern France, linking the Burgundian Low Countries, Luxembourg, Alsace and Lorraine, Switzerland, Imperial Burgundy, and the duchy of Burgundy.

(12) Failing in this attempt, and killed in battle, he left only a daughter as an heir, Mary, who was married to the Habsburg Archduke, Maximilian.

(13) In 1496, their son Philip (now also an Archduke) married Joanna the Mad, daughter of the king and queen of Spain: the famous Ferdinand and Isabella who had just united Castile and Aragon into the kingdom of Spain, after conquering Granada and sending Columbus across the Atlantic.

(14) That union produced the far more famous Charles V, who became both King of Spain and the new Holy Roman Empire, ruling the vastest empire Europe had ever seen (far vaster than the old Roman Empire, including the Americas, but whose economically most prized possession was the Low Countries. Charles retired to a monastery in 1555, dividing his empire in two.

(15) The famous and momentous Revolt of the Low Countries against Spanish rule, from 1568, I shall leave to the second term; but I will come back to these events in discussing the rise of Dutch commerce.

c) **Agricultural Productivity in Low Countries**:

i) **even in medieval era, this region, especially Flanders,** had achieved the most advanced agriculture in Europe, with possible exception of the Po Valley (Lombard plain) in northern Italy.

ii) **In the early-modern era, agricultural productivity continued to advance,** but now especially in Holland, with aid of much improved farm technology that spread directly to England (or promoted its revival there).

iii) **Consider these statistics:** by 18th century, grain yields in Low Countries and England had risen from about 4:1 in Middle Ages to 10 or 11:1; elsewhere in western Europe (18th century: France, Germany, Italy), only 7:1; and in eastern Europe still at medieval level of 4:1.

iv) **The new farming technology:**

(1) involved much more intensive crop rotations to reduce or eliminate the fallow;

(2) the cultivation of much more powerful Nitrogen-fixing crops; and

(3) the more efficient use of livestock-raising alternated with arable farming, known as convertible husbandry.

c) **Why were the Low Countries so Precocious in Agriculture?**

i) **Absence of manorial obligations or virtual elimination of them by the 14th century**:

(1) Indeed much of the agricultural land in Flanders and Holland had been reclaimed from the sea by free peasant communities: the Church and the counts could only attract colonist settlers by offering full freedom and very low cash rents.

(2) Thus the peasantry of this region, especially of Flanders, Holland, and Zealand, was a free peasantry, fundamentally controlling their own lands.

ii) **Population density**:

(1) Flanders was amongst the most densely population regions in Europe (40 per km^2), with much subdivision of holdings.

(2) Thus there was strong pressure to conserve land, reduce the fallow with labour intensive agriculture.

(3) 15th century Holland, however, had a lower population density ca. 1450: just 28 per km^2].

iii) **Town markets**:

(1) by the 15th century, Flanders was about 35% urbanized; Holland even more so (despite lower population densities), with about 45% living in Dutch towns.

(2) That extensive urbanization provided strong incentives for commercialized farming, growing wide variety of specialized cash crops, some industrial, instead of grain (less taxing to soil than wheat).

iv) **Urban inputs:** especially fertilizers in form of wood ashes, and night soil (i.e., human dung).

v) **Role of international trade**:

(1) In supplying cheap foreign grain imports, from France and then much more so from the Baltic.

(2) That was crucial, obviously in permitting a shift away from grain growing into more specialized cash crops and also more livestock raising.

d) **Rural Holland: the Livestock Foundations of Dutch Agriculture and Dutch Society**:

i) In a stimulating article, Jan De Vries has argued that agrarian economies based on livestock rather than

on arable (i.e., grain growing) resist feudalism and enserfment.[7]

ii) **De Vries:** 'The mobility of a herding population and the ability of livestock to serve as a medium of exchange make herders less exposed to enserfment than a sedentary arable farming population.'

iii) **Furthermore, because livestock husbandry is labour extensive,** it leads to naturally to supplementary bye-employments and especially to trade, in order to secure other foodstuffs -- i.e., grain.

iv) **Livestock economies for these reasons become monetized earlier,** and more fully, than grain-based arable economies.

v) **Land Reclamation by Free Peasants:** as in Flanders.

vi) **The Free Peasantry of the 16th Century:**

(1) In Holland, by the early 16th century, we find a fully free peasantry, almost half of whom (42%) own their lands outright;

(2) most of the rest held rental lands rented their holdings for annual cash quitrents.

(3) Holland then had only 12 feudal families, owning just 10% of the lands, which, to repeat, they rented out as freehold tenancies.

d) **Intensive arable husbandry in both Flanders and Holland: was almost entirely undertaken on individual (unified), private, small-scale farms**:

i) **individual peasant proprietorships:**

(1) in both Flanders and Holland there was, to repeat, virtually no communal farming.

(2) The Flemish Revolt of Maritime Flanders, 1323-1328: in rural maritime Flanders the peasant communities revolted against supposed or perceived exactions by feudal landowners; and in this revolt they were soon joined by some of the major towns (Bruges and Ypres).

(3) That revolt was crushed by the French army in 1328; but despite the seeming feudal victory in Flanders, the Flemish peasantry were never again subjected to any feudal exactions.

(4) No such revolt was ever necessary in Holland to the north.

(5) It may be argued that this individual control of the land was necessary for innovation and diffusion of new techniques; and individual peasant proprietorships was evidently a much more important factor than scale, than the size of farms.

ii) **Farm Size:**

(1) Peasant farms were typically 35 - 45 acres (15 - 18 hectares) in the interior;

(2) On the coast, we find smaller farms of 10 acres -- smaller since peasants had access to alternative livelihoods and food from fishing and coastal trades, especially in Holland.

4. <u>The New Techniques of Intensive Husbandry in the Late-Medieval Low Countries</u>

a) **The objective of the new intensive husbandry was to reduce the amount of land lying fallow,** to reduce the fallow to zero if possible, while maintaining or increasing the fertility of the soil

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[7] Jan De Vries, 'On the Modernity of the Dutch Republic', *The Journal of Economic History*, 33 (Mar 1973).

b) **This meant altering the traditional three-course crop rotations (i.e., winter grains, summer grains and legumes, and fallow), as follows:** after listing them, I will deal with each of them in turn:
i) **By convertible husbandry:** alternation in the use of land between arable and pasture
ii) **By the cultivation of fodder crops to feed larger herds of livestock,** especially stall-feeding
iii) **By growing leguminous crops,** especially fodder crops, that had much more powerful nitrogen fixing properties
iv) **By intensive manuring.**
v) **By row- and bed-cultivation:** with intensive cultivation to aerate the soil and eliminate weeds.
c) **Convertible Husbandry**: It is first found near Ghent, in Flanders, in the 1320s.
i) **meant the alternation in the use of land between arable and pasture:** as opposed to the permanent division of the land between arable and pasture, in the traditional three-course open-field system of farming.
ii) **Thus a block of arable land might be converted into pasture,** with sewn grasses to feed the livestock; and this land would be retained in pasture for say five years, during which it would receive extensive manuring from the grazing livestock, building up the nitrogen content.
iii) **The natural grasses themselves would help fix more nitrogen into the soil,** for reasons that we saw earlier in discussing legumes in the three-field system.
iv) **After five years or so, this land would be removed from pasture and converted back into arable;** and the other half of the land, which had been arable, would then be laid down to grass, to serve as pasture lands for the next five years.
v) **The other half, now put into arable,** after having been in pasture for five years, would have very high levels of nitrogen, thus permitting intensive arable cultivation for the next five years
vi) **This arable section would undergo crop rotation for the next five years,** with a five-course rotation: winter grains (wheat and rye), summer grains (oats and barley), legumes (peas, beans, clover, grasses), other fodder crops (e.g. turnips, vetches), and industrial crops (madder, flax).
vii) **There would either be no fallow,** or fallow once every five years.
d) **Fodder and Leguminous Crops:**
i) **Either in such a system of convertible husbandry,** or just in intensive arable cultivation alone, leguminous and other fodder crops could be grown in what used to be the fallow fields (or grown as so-called ‘after crops’, after the harvest of the main grain crops.
ii) **The fodder crops would be fed to livestock,**

- thus allowing stall-feeding of increased herds of livestock,
- which would produce that much more manure to be spread upon and dug into the arable fields.
- Mentioned in late 13th-century Flanders (vetches)

iii) **Legumes:** as noted earlier, these are nitrogen fixing-crops (by the bacteria parasitic on their root systems, absorbing nitrogen from the atmosphere.
(1) The traditional legumes had been peas and beans, which, however are relatively very low-powered in their nitrogen-fixing properties.

(2) But other legumes, serving also as fodder crops, proved to be much more powerful: and the earliest of these was clover, which could fix more than three times the amount of nitrogen than peas and beans.

e) **Row or Bed Cultivation:**

i) **intensive cultivation of fodder and industrial crops (flax, madder, coleseed),** in long narrow, curved individual fields, to achieve optimum drainage and optimum use of all the soil

ii) **Slicher van Bath:** 'By shifting the beds in the field a little each year the farmers also managed to use all the soil of the field in a the course of some years.'

iii) **Intensive weeding and soil preparation:** constant aeration of the soil, irrigation, and weed controls.

f) **Intensive Fertilizing: Manures**

i) **Livestock:** stall-feeding of livestock with fodder crops to supply manure, which was then deposited and dug into the arable fields (nitrogen compounds).

ii) **The use of urban 'night soils:**' i.e., human excrement, collected in carts, sold to farmers, and similarly deposited and dug into the arable fields

iii) **Peat-ash and wood ashes:** as fertilizers, using their potassium compounds.

f) **Demographic Models of Agrarian Change:**

i) **Model I (Boserup Model): Population Growth and Labour Intensive Methods:**

(1) All of these techniques of intensive husbandry were indeed very labour intensive, requiring large amounts of relatively cheap labour.

(2) The American agricultural economist Esther Boserup has indeed argued that population density and population growth has been the chief spur to agricultural advances, if only to avoid or offset the alternative: namely the law of diminishing returns.

(3) Indeed these labour intensive techniques seem to be the most applicable only in regions of very dense and growing populations; and both in Flanders and parts of coastal England, these techniques seem to have been applied during the very late 13th and early 14th centuries, before the great depopulations made labour relatively scarce and thus more expensive.

ii) **Model II: Demographic Decline and Changes in Relative Prices**

(1) Other historians have argued, however, that demographic decline was instead more important in providing a stimulus for adopting these new techniques: by altering relative prices in agriculture to encourage a shift away from reliance on bread grains

(2) The common belief is that the late-medieval depopulations produced an agrarian recession principally in grain farming; and that grain prices therefore fell much more sharply than did the prices of other agricultural commodities, especially livestock commodities

(3) Hence an incentive to shift away from wheat growing into livestock raising and the cultivation of other non-crops, especially livestock oriented crops (fodder crops) and industrial crops.

(4) The result would thus be seen in both the multi-course rotations and convertible husbandry above.

iii) **The Low Countries** seems to offer examples that would fit both models of agrarian changes, with changes in farming techniques spread of several centuries from the 13th to 16th, thus embracing periods of both demographic growth and demographic decline.

Table 1.

Wheat prices in late-medieval Tuscany

Prices of a Staio of Wheat at Pistoia, Tuscany
1201-25 to 1427
Mean of 1201-25 in Gold Prices = 100

Quarter Century Period	Gold Price Index: based on the florin
1201-25	100
1276-1300	204
1301-25	170
1326-50	125
1351-75	146
1376-1400	150
1401-25	134
1427 (one year only)	67

1 Staiao of wheat = 25.92 litres or 0.73 bushel

Source: David Herlihy, *Medieval and Renaissance Pistoia* (1967), p. 123

Table 2:

Prices of Grain (Wheat) in Florence

in soldi piccioli per staio of grain and in gold florins
1 staio = 25.92 litres = 0.73 bushels

in quinquennial means: 1306-10 to 1496-1500

Index Numbers: mean of 1451 - 75 = 100

Years quinquennial mean	Price in soldi base mean = 19.926 s.	Soldi Price Index Numbers 1451-75 = 100	Value of Florin in soldi	Grain Price in Florins base mean = 0.208 florins	Price of 100 staio in florins	Florin Price Index Numbers 1451-75 = 100
1309-10	9.500	47.677	58.667	0.162	16.193	77.776
1311-15	13.000	65.243	58.533	0.222	22.194	106.600
1316-20	11.033	55.373	58.000	0.190	19.023	91.368
1321-25	13.383	67.165	65.500	0.204	20.432	98.136
1326-30	19.300	96.859	65.500	0.295	29.465	141.523
1331-35	15.633	78.456	60.900	0.258	25.780	123.823
1336-40	16.675	83.685	59.500	0.280	28.025	134.604
1341-45	17.016	85.399	60.000	0.284	28.364	136.235
1346-50	21.400	107.398	60.400	0.355	35.498	170.498
1351-55	27.000	135.503	62.000	0.435	43.548	209.163
1356-60	14.557	73.056	62.000	0.235	23.479	112.769
1361-65	14.399	72.266	62.000	0.232	23.225	111.550
1366-70	22.866	114.759	66.600	0.346	34.553	165.960
1371-75	28.825	144.661	65.166	0.442	44.233	212.450
1376-60	18.340	92.042	65.166	0.281	28.144	135.174

Years quinquennial mean	Price in soldi base mean = 19.926 s.	Soldi Price Index Numbers 1451-75 = 100	Value of Florin in soldi	Grain Price in Florins base mean = 0.208 florins	Price of 100 staio in florins	Florin Price Index Numbers 1451-75 = 100
1381-85	29.100	146.043	65.166	0.447	44.655	214.480
1386-90	33.267	166.954	67.350	0.493	49.342	236.993
1391-95	28.833	144.704	76.084	0.379	37.897	182.018
1396-1400	25.133	126.135	76.084	0.330	33.033	158.661
1401-05	20.667	103.719	76.400	0.270	27.050	129.920
1406-10	23.167	116.266	76.500	0.303	30.283	145.451
1411-15	24.850	124.714	76.500	0.325	32.484	156.020
1416-20	24.600	123.459	79.300	0.310	31.047	149.122
1421-25	16.600	83.310	80.150	0.207	20.717	99.507
1426-30	13.000	65.243	80.750	0.161	16.099	77.324
1431-35	21.200	106.396	80.750	0.263	26.254	126.098
1436-40	22.400	112.418	80.750	0.277	27.740	133.236
1441-45	20.300	101.879	80.750	0.251	25.139	120.745
1446-50	15.800	79.295	80.750	0.196	19.567	93.979
1451-55	19.100	95.857	80.750	0.237	23.653	113.607
1456-60	21.000	105.392	80.750	0.260	26.006	124.909
1461-65	18.200	91.340	108.800	0.167	16.714	80.279
1466-70	18.748	94.090	109.000	0.172	17.200	82.612
1471-75	22.580	113.322	110.000	0.205	20.527	98.593
1476-80	24.374	122.325	110.000	0.222	22.158	106.426
1481-85	28.458	142.821	120.000	0.237	23.715	113.904

Years quinquennial mean	Price in soldi base mean = 19.926 s.	Soldi Price Index Numbers 1451-75 = 100	Value of Florin in soldi	Grain Price in Florins base mean = 0.208 florins	Price of 100 staio in florins	Florin Price Index Numbers 1451-75 = 100
1486-90	23.378	117.326	123.800	0.189	18.930	90.920
1491-95	20.716	103.967	130.000	0.159	15.935	76.538
1496-1500	38.588	193.660	130.000	0.297	29.683	142.569

Source:

Sergio Tognetti, ‘Prezzi e salari nella Firenze tardomedievale: un profilo’, *Archivio storico italiano*, 153: 564 (1995), 263-333: Table A1, pp. 317-18.

Table 3.

Masons' Wages in Florence

Daily Wages of Master Masons
in soldi piccioli per day and in staio of wheat
1 staio of wheat = 25.92 litres or 0.73 bushels

in quinquennial means: 1311 - 15 to 1496 - 1500

Index numbers: mean of 1451 - 75 = 100

Year	Masters (Masons)	Index Numbers 1451-75 =100	Price of Grain per Staio	Index Numbers 1451-75 =100	Staio of Grain bought daily wage	Index Numbers 1451-75 =100
1311-15	7.15	40.34	13.000	65.243	0.572	56.743
1316-20	7.15	40.34	11.033	55.373	0.665	65.991
1321-25	7.15	40.34	13.383	67.165	0.587	58.264
1326-30	7.15	40.34	19.300	96.859	0.435	43.166
1331-35	7.15	40.34	15.633	78.456	0.481	47.773
1336-40	7.24	40.85	16.675	83.685	0.468	46.497
1341-45	7.28	41.07	17.016	85.399	0.442	43.875
1346-50	12.14	68.49	21.400	107.398	0.581	57.619
1351-55	17.50	98.74	27.000	135.503	0.732	72.655
1356-60	15.42	87.00	14.557	73.056	1.116	110.808
1361-65	15.28	86.21	14.399	72.266	1.119	111.021
1366-70	16.14	91.06	22.866	114.759	0.926	91.910
1371-75	16.32	92.08	28.825	144.661	0.663	65.848
1376-80	15.52	87.56	18.340	92.042	0.865	85.815
1381-85	16.22	91.51	29.100	146.043	0.573	56.863
1386-90	16.43	92.70	33.267	166.954	0.508	50.414
1391-95	16.84	95.01	28.833	144.704	0.693	68.799

Year	Masters (Masons)	Index Numbers 1451-75 =100	Price of Grain per Staio	Index Numbers 1451-75 =100	Staio of Grain bought daily wage	Index Numbers 1451-75 =100
1396-00	16.34	92.19	25.133	126.135	0.664	65.923
1401-05	18.04	101.78	20.667	103.719	0.884	87.746
1406-10	17.82	100.54	23.167	116.266	0.790	78.450
1411-15	17.66	99.64	24.850	124.714	0.791	78.467
1416-20	18.66	105.28	24.600	123.459	0.805	79.921
1421-25	19.04	107.42	16.600	83.310	1.235	122.611
1426-30	17.88	100.88	13.000	65.243	1.409	139.878
1431-35	17.08	96.37	21.200	106.396	0.854	84.796
1436-40	19.52	110.13	22.400	112.418	0.909	90.251
1441-45	20.36	114.87	20.300	101.879	1.229	121.957
1446-50	17.90	100.99	15.800	79.295	1.148	113.920
1451-55	18.18	102.57	19.100	95.857	0.958	95.123
1456-60	16.12	90.95	21.000	105.392	0.983	97.555
1461-65	18.38	103.70	18.200	91.340	1.195	118.621
1466-70	16.94	95.58	18.748	94.090	0.931	92.356
1471-75	19.00	107.20	22.580	113.322	0.971	96.345
1476-80	15.46	87.23	24.374	122.325	0.674	66.876
1481-85	15.26	86.10	28.458	142.821	0.577	57.314
1486-90	16.16	91.18	23.378	117.326	0.698	69.281
1491-95	14.62	82.49	20.716	103.967	0.738	73.292
1496-00	13.16	74.25	38.588	193.660	0.387	38.439

Sources:

Sergio Tognetti, ‘Prezzi e salari nella Firenze tardomedievale: un profilo’, *Archivio storico italiano*, 153: 564 (1995), 263-333: Table A1, pp. 317-18.

Paolo Malanima's Tables on Prices and Wages in Italy, 1270 - 1913: available in a Word file online at:
http://www.economics.utoronto.ca/munro5/StatResources.htm

Table 4.

Share-cropping (mezzadria) in late-medieval Tuscany

Mezzadria Lease Contracts in Pistoia, 1300-1425

Quarter-Century Period	Proportion of Agricultural Leases in the form of Mezzadria Contracts
1301-25	5.6%
1326-50	45.7%
1351-75	55.0%
1376-00	54.7%
1401-25	66.7%

Source: David Herlihy, *Medieval and Renaissance Pistoia* (1967), p. 127.

Table 5.

Convertible Husbandry ('up and down' farming)

SECTION I: PASTURE LANDS FOR GRAZING LIVESTOCK 1) These lands, comprising about half of the farm holdings, are 'laid down to grass' for about five years, for pasturing livestock (sheep and/or cattle), allowing these lands to regain their fertility and store up large stocks of nitrogen. If the livestock are also 'stall-fed' -- i.e., from fodder crops outside the pasture -- their manure will add net amounts of nitrogen compounds to the soil 2) After five or so years, these pasture lands are 'ploughed up for arable', to follow the five-course crop system indicated below for Section II (the other half of the farm holdings). After another five years, these lands, now arable, are again 'laid down to grass' to serve as pasture lands for the following five years.	
SECTION II: THE ARABLE FIELDS (with no fallow) **Note:** The arable is divided into five fields, which undergo a five-course crop rotation over the next five years, with no fallow. After five years, the entire arable is laid down to grass to become pasture for livestock grazing for the following five years. **.....**	
ARABLE FIELD A:	WINTER GRAINS: Wheat and/or Rye grains
ARABLE FIELD B:	THE NEW LEGUMES: Clover, Alfalfa (Lucerne), and Sainfoin grasses (high nitrogen-fixing properties), as animal fodder crops
ARABLE FIELD C:	PULSES: Beans and Peas (low in nitrogen-fixing properties, for human consumption)
ARABLE FIELD D:	SUMMER GRAINS: Barley (for beer) and Oats (to feed both humans and horses)
ARABLE FIELD E:	OTHER NEW CROPS: Coleseed and Rapeseed (for both industrial oils and animal fodder); or Turnips (chiefly for animal fodder)

'New' Crops Grown Under Multiple Crop Rotations in Convertible Husbandry (or in 'Norfolk Farming'): gradually diffused from the 15th to 18th centuries.

Clover, Alfalfa (Lucerne), Sainfoin, Coleseed, Rapeseed, Flax, Buckwheat, Hops, Turnips

Nitrogen Fixing Properties of Various Legumes in kg per hectare (2.47 acres)

Beans and Peas (Pulses)	30 kg per hectare
Clover	100 kg per hectare
Sainfoin	170 kg per hectare