令和6年度特色入試問題

《 農学部 食料・環境経済学科 》

小論文試験

200 点満点

(注　意)

1. 問題冊子および解答冊子は係員の指示があるまで開かないこと。
2. 問題冊子は表紙のほかに 8 ページある。
3. 解答冊子は表紙のほかに，下書き用紙を含め 10 ページある。
4. 試験開始後，解答冊子の表紙所定欄に受験番号・氏名をはっきり記入すること。
   表紙には，これら以外のことを書いてはならない。
5. 解答はすべて解答冊子の指定された箇所に記入すること。
6. 解答に関係のないことを書いた答案は無効にすることがある。
7. 解答冊子は，どのページも切り離してはならない。
8. 問題冊子は持ち帰ること。解答冊子は持ち帰ってはならない。
9. 解答は日本語で記入すること。

1 次の【1】、【2】の英文および図表は、いずれも 19 世紀中葉に生じたアイルランド大飢饉に関するものである。これらの文章を読んで下記の問いに答えなさい。（100 点）

【1】The proximate cause of the Great Irish Famine（1846–1852）was the fungus *phythophtera infestans*[*1]（or potato blight）, which reached Ireland in the fall of 1845. The fungus destroyed about one-third of that year's crop, and nearly all that of 1846. After a season's remission[*2], it also ruined most of the 1848 harvest. These repeated attacks made the Irish famine more protracted[*3] than most. Partial failures of the potato crop were nothing new in Ireland before 1845, but damage on the scale wrought[*4] by the ecological shock of potato blight was utterly unprecedented. ①However, the famine would not have been nearly so lethal[*5], had Ireland's dependence on the potato been less. The experience of other European economies in the 1840s is telling in this respect. In Ireland the daily intake of the third or so of the population mainly reliant on the potato was enormous: 4–5 kilos daily per adult male equivalent for most of the year. After allowing for non-human consumption and provision for seed, the 2.1 million acres（or 0.8 million hectares）under potatoes in the early 1840s produced 6.2 million metric tons for human consumption. That amounted to an average daily intake of 4.6 lbs[*6]（or over two kilos）per man, woman, and child. In France, by comparison, the average daily intake of potatoes was only 165 grams in 1852; in Norway in the early 1870s, 540 grams; in the Netherlands about 800 grams in the 1840s; in Belgium 640 grams.

Ireland was a poor country in 1845, income per head being about half that in the rest of the United Kingdom. The regional contrast between the northeast, which was undergoing rapid industrialization at this time, and the west and the south was marked. Moreover, while there were some signs of a rise in urban and middle-class living standards, the half-century or so before the famine was a period of increasing impoverishment[*7] for the landless poor. Population rose from about five million in 1800 to seven million in 1820 and 8.5 million in 1845. A rising emigration rate and a falling birth rate offered only partial relief to increasing population pressure. Moreover, demographic adjustment was weakest in the western and southern areas most at risk. The collapse of a largely home-based textile industry exacerbated the situation in some rural areas, particularly in north Connacht[*8] and south Ulster[*9]; the result was increasing dependence on the potato and increasing recourse[*10] to seasonal migration during the summer months. The nutritional content of the potato and widespread access to heating fuel in the form of turf[*11] eased somewhat the poverty of Ireland's three million 'potato people', who were healthier and lived longer than the poor in other parts of Europe at the

time. One indication of this, based on evidence from military and prison archives, is that adult Irish males from the lower end of the socio-economic scale on the eve of the famine were at least as tall as, if not taller than, their English peers. However, their poverty meant that when the potato failed, there was no trading down to a cheaper alternative food.

（出典：Ó Gráda, Cormac, 2007. 'Ireland's Great Famine. An Overview', *When the Potato failed. Causes and effects of the 'last' European subsistence crisis, 1845-1850*, Edited by Cormac Ó Gráda, Richard Paping & Eric Vanhaute, Brepols Publishers, pp. 43–45 を一部改変）

（語注）*1 fungus *phythophtera infestans* 疫病菌、*2 remission 小康状態、*3 protracted 長引く、*4 wrought（work の過去分詞）、*5 lethal 致命的な、*6 lb(s) ポンド、*7 impoverishment 貧窮、*8 Connacht コノート地方、*9 Ulster アルスター地方、*10 recourse to ～に頼ること、*11 turf 泥炭

【2】②Berthold Brecht[*12] once wrote that famines don't just happen; they are organized by the grain trade. In Ireland in the late 1840s many poor people doubtless believed that the determination of traders or producers to corner[*13] markets or to extract higher prices exacerbated the famine. However, an analysis of price data suggests that at least at wholesale[*14] level markets worked more or less as normal. Nor does the evidence of sales at Cork's[*15] potato markets support the belief that during the famine traders held back[*16] a higher-than-normal proportion of output earlier in the season. That is not to say that supplies responded to price signals like clockwork: on the contrary, merchants responded cautiously to the challenge of finding substitute foods（mainly maize）for the potato. However, as Amartya Sen[*17] reminds us, "the law stands between food availability and food entitlement. ③Starvation deaths can reflect legality with a vengeance[*18]". Alas[*19], for those stripped of subsistence by the blight, the functioning of food markets was somewhat of a red herring[*20].

Table 1 Aggregate Irish food supplies, 1840-1845 and 1846-1850 (in 1,000 million kcal/day)

	1840–1845	1846–1850
Irish Production (less seed and horses)	32.1	15.7
Less exports and non-food uses	–11.8	–3.1
Net domestic supplies	20.3	12.6
Plus imports	+0.2	+5.5
Total consumption	20.5	18.1

Table 1 is a stark reminder of the point that markets worked slowly. Comparing the two periods, 1840–1845 and 1846–1850, captures the fall in production but also suggests that imports largely made up for the shortfall in production. However, this ignores the lag between the failures of the potato in 1845 and 1846 and the arrival of large quantities of imports of Indian corn in the spring of 1847. ④Treating the 1846–1850 period as a block muffles[*21] the serious supply problems in 1846–1847 in particular. During the famine Ireland switched from being one of Britain's bread baskets to being a net importer of food-grains. However, in the winter and spring of 1846/47 exports still exceeded imports, presumably because the poor in Ireland lacked the purchasing power to buy the wheat and oats that were being shipped out.

（出典：前掲書 p. 53 を一部改変）

（語注）*12 Berthold Brecht ベルトルト・ブレヒト（ドイツの劇作家：1898–1956）、*13 corner 追い込む、*14 wholesale 卸売りの、*15 Cork コーク市（都市名）、*16 hold back 抑える、*17 Amartya Sen アマルティア・セン（インド出身の経済学者：1933 – ）、*18 with a vengeance 一段と強烈に、*19 Alas ああ！（間投詞）、*20 red herring 燻製ニシン（ここでは「人を惑わせるもの」という意味）、*21 muffle 消す、隠す

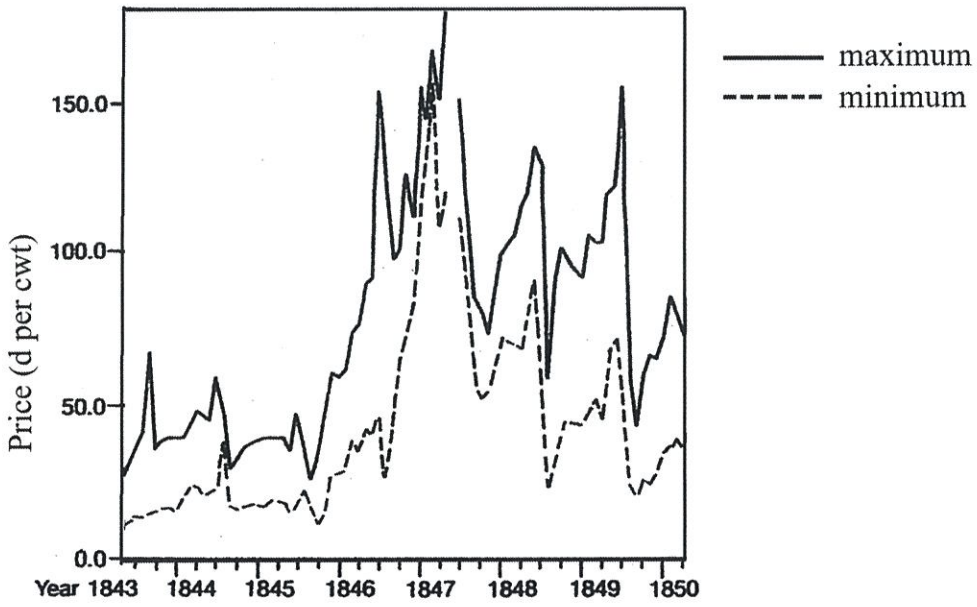

Figure 1　Minimum and maximum potato prices, Dublin market

出典：Ó Gráda, Cormac, 1993. *Ireland before and after the Famine. Explorations in economic history, 1800–1925*, Second edition. Manchester University Press, p. 117 より作成。

注：Price (d per cwt)：cwt (=hundredweight)は当時のイギリスの重量単位で約 50kg に相当する。d (=penny)は当時のイギリスの通貨単位ペンスを表す。

問１　【１】の英文について以下の問いに答えよ。

（１）下線部①を和訳せよ。

（２）筆者が下線部①のように述べるのは、アイルランドの人々の貧しさがどのようなものだったと考えているからなのか。本文に即して述べよ。

問２　【２】の英文について、次の問いに答えよ。

（１）筆者は下線部②のブレヒトの飢饉に関する議論をどのように批判しているか、本文に即して述べよ。

（２）筆者は下線部③で何が言いたいのか。Figure 1 に言及しつつ、そのいわんとするところを解釈せよ。

（３）Figure 1、および本文中の Table 1 に基づき、かつ下線部④に留意しつつ、1840 年から 1850 年の期間にアイルランドの食料供給に何が生じたかについて述べよ。

問３　【１】、【２】の英文の内容をふまえ、深刻な飢饉を生じさせないためにはどうすればよいか、あなたの考えを述べよ。

2 以下の英文を読んで問１～問５に答えなさい。（100点）

We study the relationship that exists between a person's nutritional status and his capacity to do sustained work, and we study how this relationship creates a vicious[*1] cycle in the labor market: poverty leading to undernutrition, hence the inability to work, which feeds back on the incidence of poverty. Thus undernutrition plays a functional role apart from being of intrinsic[*2] interest. Because undernutrition affects the capacity to work, it affects the functioning of labor markets in a central way.

Energy balance

To start thinking seriously about this problem, it is useful to examine the simplest story of energy balance within the human body. It has four main components.

1. *Energy input.* The periodic consumption of food is the main source of energy input to the human body. ①<u>It is also the obvious point where nutrition meets economics.</u> Access to food, in most situations, is the same as access to income. In the case of the poor, income chiefly represents returns to labor supply and (to a lesser extent) to nonlabor assets such as small quantities of land.
2. *Resting metabolism*[*3]. This is a significant proportion of the body's requirements. It represents the energy required to maintain body temperature, sustain heart and respiratory[*4] action, supply the minimum energy requirements of resting tissues, and support ionic gradients[*5] across cell membranes[*6]. For the "reference man" of the Food and Agricultural Organization (FAO), who is a European male and weighs 65 kg, this figure is around 1,700 kcal per day. Of course, the exact number varies significantly with the characteristics of the individual and the ambient[*7] environment in which he lives. An important determinant, for instance, is body mass: a higher body mass raises resting metabolism.
3. *Energy required for work.* The second significant component is energy required to carry out physical labor. The FAO's 1973 estimate, applied to their reference man, prescribed 400 kcal per day for "moderate activity." Unfortunately, as Clark and Haswell [1970, p. 11] pointed out, the FAO reference man "appears to be a European weighing 65kg, and who spends most of his day in a manner rather ambiguously defined, but apparently not working very hard." For the poor in less developed countries, who are subject to hard labor of the most strenuous[*8] kind, this may be a somewhat conservative estimate. Although precise estimates are impossible without knowing the kind of work the individual has to perform, it is probably safe to say that

the figure is significantly higher than 400 kcal per day.

Clark and Haswell's interesting book contains information on the energy requirements for various types of physical activity, culled[*9] from the work of different authors. Thus, in studies of West African agriculture, estimates of calorie consumption vary from 213 kcal per hour for carrying a log of 20 kg, to 274 kcal per hour for hoeing[*10], to 372 kcal per hour for bush clearing, and up to 502 kcal per hour for tree felling. Of course, there are activities that are not (and cannot) be performed continuously over large stretches of time, but the European reference man with his allotment of calories for physical activity might be hard pressed to carry out any of these at minimal levels. The point, then, is clear enough. The labor of the poor is often physical labor, and physical labor requires significant amounts of energy.

4. *Storage and borrowing*. It should be quite obvious by now that, over a period of time at least, we can expect to see some form of balance between item 1, energy input, and the sum of the components in items 2 and 3. In the short or medium run, however, excesses or deficits can be cushioned (to some extent) by the human body. An energy deficit is met by running down stores from the body. An energy surplus is partly dissipated[*11], partly stored. Well-fed people in developed countries worry about the second problem (especially the possibility that energy surpluses may be stored and not dissipated). For the hundreds of millions of people that suffer undernutrition, the real problem is the first: coping with the threat of an energy deficit. A sustained deficit leads to undernutrition, and—ultimately—the breakdown of the body via illness, incapacitating debility[*12], or death.

The point that we need to be aware of is that not only do labor markets generate income and therefore create the principal potential source of nutrition and good health, but good nutrition in turn affects the capacity of the body to perform tasks that generate income. There is a cycle here, and this cycle alerts us to the possibility that in developing countries, a significant fraction of the population may be caught in ②a poverty trap.

To fix our ideas, ignore for the moment the possibility of borrowing or storage. Figure 1 shows the relationship between nutrition and the capacity to perform productive work, which we refer to as ③the capacity curve.

Observe closely the labeling of the axes in Figure 1. In particular, the x axis, which really should be "nutrition," has been labeled "income." The implicit assumption here is that all income is spent on nutrition. Nothing of substance is lost by amending this to a

more realistic situation where, say, 70% of income is spent on nutrition, but as you'll see, the exposition[*13] is just easier this way. The y axis is labeled with the vague-sounding phrase "work capacity." How can we conceptually think about this? The idea is to think of work capacity as a measure of the total number of tasks an individual can perform during the period under review, say, the number of bushels of wheat that he can harvest during a day. The capacity curve is found by linking different nutrition (or income) points to the corresponding levels of work capacity that are generated by the individual.

To understand ④the shape of the capacity curve, ask yourself what happens as we move from left to right along the x axis; that is, as we increase the amount of income (nutrition) available to the individual. Initially, most of this nutrition goes into maintaining resting metabolism, and so sustaining the basic frame of the body. In this stretch very little extra energy is left over for work (remember again that for the moment, we are ruling out the depletion of body stores of energy). So work capacity in this region is low (close to zero, if you like) and does not increase too quickly as nutrition levels change. Once resting metabolism is taken care of, however, there is a marked increase in work capacity, as the lion's share of additional energy input can now be funneled[*14] to work. This phase is followed by a phase of diminishing returns, as the natural limits imposed by the body's frame restrict the conversion of increasing nutrition into ever-increasing work capacity. (The curve probably even turns downward after a point, reflecting the usual concerns of the developed world, but we ignore that here.)

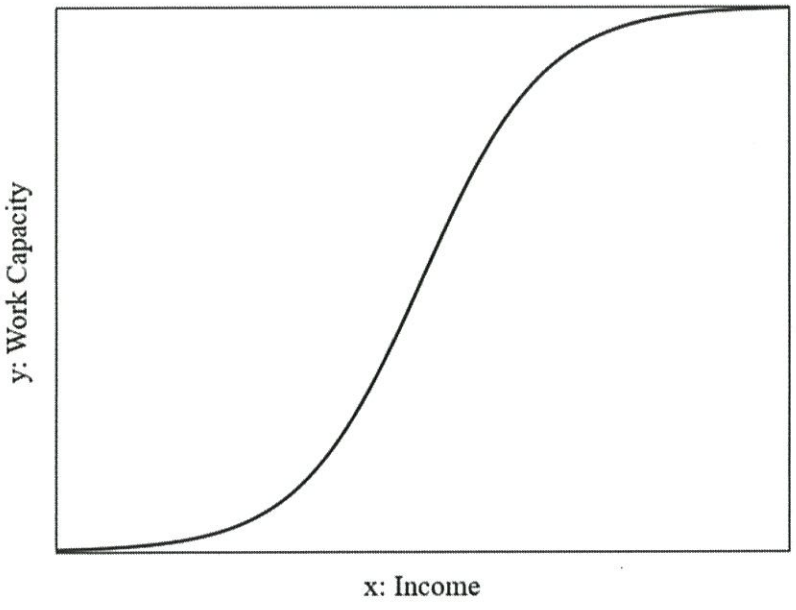

Figure 1 The capacity curve

（出典：Ray, Debraj, 1998. *Development Economics*. Princeton University Press, pp. 272–275 を一部改変）

（語注）*1 vicious 悪質な、*2 intrinsic 本質的な、*3 resting metabolism 安静時代謝、*4 respiratory 呼吸器の、*5 ionic gradients イオン勾配、*6 membranes 膜、*7 ambient 取り巻く、*8 strenuous 大いに骨折る、*9 cull 選り抜く、*10 hoeing 鍬で除草すること、*11 dissipate 消散させる、*12 incapacitating debility 動けないほどの衰弱、*13 exposition 解説、*14 funnel 送り込む

問１　下線部①に関して、栄養問題を考える際に、なぜ経済学の視点が重要か、本文を参考にしながら説明せよ。

問２　下線部②に関して、ここで言及されている poverty trap の発生メカニズムを途上国の文脈で具体的に説明せよ。

問３　下線部③に関して、capacity curve の例として以下の関数を考える。

$$f(x) = \frac{12}{1 + e^{-x+6}}$$

この関数は本文の Figure 1 のような形状であることが知られている。以下の問に答えよ。

（１）　$f(x)$はxに関して単調増加関数であることを示せ。

（２）　極限値$\lim_{x\to\infty} f(x)$および$\lim_{x\to-\infty} f(x)$を、それぞれ求めよ。

（３）　$f(x)$の唯一の変曲点は、点(6, 6)であることを示せ。

（４）　$f(x)$は、点(6, 6)に関し点対称なグラフになることを示せ。

問４　下線部④に関して、所得と労働能力との関係として、なぜ Figure 1 で示されているような形状を想定することが妥当なのか、本文に即して説明せよ。

問５　所得と労働能力の間に Figure 1 で示されているような関係を想定した場合、発展途上国の貧困者に対する援助として、どのような政策介入が望ましいと考えられるか、あなたの意見を述べよ。

令和６年度 特色入試

問題訂正（農学部食料・環境経済学科　小論文試験）

下記の問題訂正があります。

記

問　題　訂　正

農学部 食料・環境経済学科 小論文試験　問題冊子

1

１ページ　下から４行目

（誤）recourse*10 to

↓

（正）recourse to*10

2

８ページ　１１行目

（誤）問２　・・・を途上国の文脈で・・・

↓

（正）問２　・・・を発展途上国の文脈で・・・

以上