CXCIII. EXPERIMENTS ON NUTRITION.

XI. COMPARATIVE VITAMIN B₁ VALUES OF FOODSTUFFS. FRUITS AND VEGETABLES.

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THE vitamin B or B₁ values of fruits were first investigated by Osborne and Mendel [1919] who found that 5 g. of fresh apples or pears averted a decline in weight of rats, and that 10 cc. of orange juice daily gave good growth. Later [1920], they showed that 10 to 15 cc. daily of orange, lemon or grape fruit juice led to normal growth of rats. The juice of the grape was not good; some growth resulted with 2 to 5 g. of prunes. Apples and pears were then again tested and found to be a poor source of vitamin B. The poor value of grape juice has also been recorded by Randoin [1930]. The banana was shown by Sugiura and Benedict [1918] to be deficient in vitamin B. Miller [1926] found that 15 to 20 g. daily of papaya as source of vitamin B gave fair growth in rats. Experiments with orange juice have also been made by Stammers [1924] and by Willimott [1928], who confirm the earlier results that 10 cc. gave good growth but scarcely equal to the normal. The rind of lemon and grape fruit contained vitamin B as shown by Willimott and Wokes [1926]. House, Nelson and Haber [1929] stated that 3 g. of fresh tomato daily sufficed for maintenance of rats. The only tests on pigeons appear to be those by Chick and Hume [1917] who found that extracts of currants and dates had only a very slight curative effect on pigeons suffering from polyneuritis.

A fairly large number of vegetables have been examined for their comparative values in vitamin B. In all these experiments the dried vegetable was used and growth of rats was the criterion of their value. In the earlier tests the vegetable was incorporated in the food, but later a small quantity of the dried vegetable was given daily, in many experiments by Osborne and Mendel after a decline in growth of the rats had started. The results are summarised in Sherman and Smith's book [1931] and, in order to save space, are not quoted in detail here.

The older standard test, cure or prevention of polyneuritis in pigeons, for the presence of vitamin B₁ so much advocated by Chick [see Chick and Copping, 1930] has not been used since the tests on cabbage and potato by Chick and Hume [1917]. The curative method was then used: cabbage was

found to contain vitamin B, but potato was almost deficient. The preventive method has not hitherto been tried with fruits and vegetables. We have used this method throughout our series of experiments and are now able to report upon a series of about 30 common fruits and vegetables. Some of these tests were made several years ago, but to complete the series and publish as a whole was considered preferable to publishing one or more of the results separately. A clearer picture is thus revealed and reference to the matter is much easier.

EXPERIMENTAL.

The tests on the vitamin B₁ values of fruits and vegetables have been made on pairs of pigeons under the same housing conditions as in our previous experiments with pulses, nuts and cereals [Plimmer, Raymond and Lowndes, 1929, 1931].

It was recognised that the high water content of fruits and vegetables would occasion some difficulty in our method of testing, *i.e.* mixing the food-stuff with white rice or white flour and fishmeal. In a dried form only apple rings and apricots were obtainable; cabbage and other leaves could be dried by exposure to warm air, and roots, like carrots, could be cut up into small cubes. Our trials with these foodstuffs thus prepared and mixed with white rice and fishmeal led to no result, as the pigeons ate the rice and left the fruit or vegetable and suffered from polyneuritis. This experience led to the conclusion that these foods contained very little vitamin B₁, for we had always noticed that pigeons preferred foods containing vitamin B₁ to white rice and generally ate such foods first and left the white rice. Only boiled potato, passed through a squeezer, was readily eaten by the birds. It thus seemed that pigeons preferred fruits and vegetables in the cooked state. Cooked vegetables and fruits were therefore used as the means of procuring consumption. At the same time water could be removed by evaporation. Our procedure was to pass the fruit or vegetable through a mincer, collect all the water and solid matter and heat in a basin on a water-bath until the material became of such a consistency that it could be mixed with flour and fishmeal, and also cod-liver oil in the later tests, to form a dough which could be made into pills and dried. Pills of most of these foods were readily eaten by the pigeons; only onions seemed distasteful and acid fruits, such as rhubarb and gooseberries, were at first not palatable. This procedure was really the most suitable as it was desired to know the value of these foods in a form as close as possible to that in which they are used in human consumption. Practically all vegetables are eaten in the cooked state and fruits are eaten fresh or cooked. No objection can be made to cooking as it has been shown by many workers that vitamin B₁ is not destroyed by a temperature of 100°. All the fruits and vegetables were purchased from a local greengrocer and were the same as those sold for human consumption.

In the tests with cereals and pulses, from 20 to 40 % had to be incorporated in the diet to secure maintenance of pigeons for our test period of 26 weeks.

In the first trials with fruits and vegetables 50 % of the fresh food was mixed with the flour and fishmeal. With most the pigeons showed head retraction in periods varying from 3 to 9 weeks. It was not considered necessary to test the food in a higher proportion except when the period was about 9 weeks; 70 or 80 % was then tried. Potato was tested at 90 and 99 %. The results are shown in the following three tables under fruits; vegetables, leaves; and vegetables, roots and tubers. They are given in alphabetical order and not in the order of testing. The order of testing depended largely upon the season of the year when the material was procurable.

Table I. *Fruits.*

Date	Time in weeks	Diet				Weights, g.		Remarks
		APPLE	White flour	Fish- meal	Cod- liver oil	Cock No. 98	Hen No. 62	
16. i. 29 to 13. ii. 29	4	50	47.5	2.5	0	500	385	
27. ii. 29	6					375	270	Hen had head retraction and was cured
						375	—	Cock had head retraction and was cured
26. iii. 30 to 30. iv. 30	5	80	18.0	1.8	0.2	No. 48 410	No. 30 295	
2. vii. 30	14					250	205	Cock had head retraction and died
						—	195	Hen died. Ate only from 3 to 10 g. daily during last 9 weeks
13. iii. 29 to 10. iv. 29	4	BANANA 50	47.5	2.5	0	No. 83 405	No. 78 390	
15. v. 29	9					320	335	Cock had head retraction and died
						—	260	Hen paralysed and died
29. v. 29 to 7. viii. 29	10	70	28.5	1.5	0	No. 93 395	No. 50 435	
						240	300	Both showed head retrac- tion. Cock died, hen cured
6. i. 26 to 10. ii. 26	5	DRIED PLANTAIN 95	0	5.0	0	No. 7 590	No. 8 450	
						500	385	No more food available Loss of weight indicates insufficient vitamin B
19. vii. 28 to 15. viii. 28	4	CURRENTS <i>red</i> 50	47.5	2.5	0	No. 330 360	No. 70 350	
29. viii. 28	6					295	275	Cock had head retraction and died
						—	240	Hen had head retraction and was cured
17. vii. 29 to 4. ix. 29	7	<i>black</i> 70	28.5	1.5	0	No. 167 385	No. 60 370	
11. ix. 29	8					270	285	Cock had head retraction and died
						—	265	Hen had head retraction and was cured

Table I. *Fruits (contd.).*

Date	Time in weeks	Diet				Weights, g.		Remarks
		GOOSE- BERRIES	White flour	Fish- meal	Cod- liver oil	Cock No. 330	Hen No. 35	
6. vi. 28 to 27. vi. 28	3	50	47.5	2.5	0	395	415	
4. vii. 28	4					355	305	Hen had head retraction and died
						325	—	Cock had head retraction and was cured
		GRAPES				No. 18	No. 39	
23. x. 29 to 27. xi. 29	5	70	28.5	1.5	0	470	480	
18. xii. 29	8					400	390	Cock had head retraction and was cured
						—	345	Hen had head retraction and was cured
		ORANGE JUICE				No. 66	No. 803	
16. i. 29 to 15. v. 29	17	50	47.5	2.5	0	445	420	Ate very little after 10th week
29. v. 29	19					310	285	Cock had head retraction and was cured
						—	205	Hen died
						No. 18	No. 39	
13. iii. 29 to 17. vii. 29	18	70	28.5	1.5	0	490	450	
29. viii. 29	24					435	375	Five eggs laid by hen Lost some weight and re- covered it
2. x. 29	29					460	405	
						420	380	
		ORANGE PEEL				No. 69	No. 79	
16. i. 29 to 13. iii. 29	8	50	47.5	2.5	0	400	370	
8. v. 29	16					255	300	Cock paralysed and died Hen not well and not eating
						—	265	Hen died
						No. 98	No. 62	
13. iii. 29 to 25. ix. 29	28	70	28.5	1.5	0	460	360	Both ate very little during whole period. Lost weight in first weeks
						325	265	
		PLUMS				No. 43	No. 128	
29. viii. 28 to 26. ix. 28	4	50	47.5	2.5	0	315	395	
3. x. 28	5					240	320	Cock had head retraction and died
						—	325	Hen had head retraction and was cured
		RHUBARB				No. 83	No. 96	
15. v. 29 to 3. vii. 29	7	50	47.5	2.5	0	400	320	
17. vii. 29	9					250	250	Cock had head retraction and died
						—	220	Hen had head retraction and was cured

Table I. *Fruits (contd.)*.

Date	Time in weeks	Diet				Weights, g.		Remarks
		STRAW- BERRIES	White flour	Fish- meal	Cod- liver oil	Cock No. 17	Hen No. 72	
27. vi. 28 to 8. viii. 28	6	50	47.5	2.5	0	450	490	
						310	345	Hen had head retraction and was cured. Cock died with large heart
		TOMATOES				No. 62	No. 43	
26. x. 27 to 30. xi. 27	5	50	47.5	2.5	0	425	460	
						345	330	Both showed head retraction and died
						No. 33	No. 36	
30. iv. 30 to 12. xi. 30	28	80	18	1.6	0.4	390	285	Hen laid 15 eggs; deserted
12. xi. 30 to 17. xii. 30	5	70	26.5	2.0	0.5	465	300	
17. xii. 30 to 28. i. 31	11					425	295	Cock had head retraction and died
						—	235	Hen had head retraction and died

Table II. *Vegetables, leaves, etc.*

Date	Time in weeks	Diet				Weights, g.		Remarks
		FRESH RUNNER BEANS	White flour	Fish- meal	Cod- liver oil	Cock No. 23	Hen No. 72	
29. viii. 28 to 17. x. 28	7	50	47.4	2.6	0	385	455	
17. x. 28 to 24. x. 28	8					260	360	Hen had head retraction and died
						235	—	Cock had head retraction and was cured
		CABBAGE				No. 81	No. 92	
12. xii. 28 to 20. iii. 29	14	50	47.4	2.6	0	380	410	
						295	385	Both birds had head retraction and were cured
						No. 645	No. 50	
25. ix. 29 to 27. xi. 29	9	70	28.4	1.6	0	430	455	
27. xi. 29 to 25. xii. 29	13					405	450	Cock had head retraction and was cured
						—	345	Hen had head retraction and died
						No. 92	No. 91	
8. i. 30 to 4. vi. 30	21	80	18.5	1.5	0	445	390	Hen laid 10 eggs; one hatched, squab died, others deserted
4. vi. 30 to 16. vii. 30	27					395	360	
						410	360	Both well, but slight loss of weight
		CAULI- FLOWER				No. 92	No. 32	
8. xi. 27 to 22. xi. 27	2	50	47.4	1.6	0	380	370	
22. xi. 27 to 13. xii. 27	5					335	345	Hen died
						240	—	Cock died

Table II. *Vegetables, leaves, etc. (contd.).*

Date	Time in weeks	Diet				Weights, g.		Remarks
		CELERY	White flour	Fish- meal	Cod- liver oil	Cock No. 17	Hen No. 16	
19. x. 27						445	430	
to 16. xi. 27	4	50	47.5	2.5	0	305	285	Hen died
to 23. xi. 27	5					325	—	Cock had head retraction and died
		KALE				No. 74 390	No. 75 365	
12. xii. 28		50	47.4	2.6	0	310	255	Hen was paralysed and died. Cock had head re- traction and died
to 6. ii. 29	8							
						No. 645 415	No. 63 345	
1. v. 29		70	28.4	1.6	0	335	245	Hen had head retraction and was cured
to 17. vii. 29	11					335	—	Cock had head retraction and was cured
to 8. viii. 29	14							
		LETTUCE				No. 89 410	No. 49 350	
11. vii. 28		50	47.6	1.4	0	325	285	Both had head retraction and were cured
to 8. viii. 28	4							
						No. 65 400	No. 58 340	Two eggs hatched, squabs died
21. v. 30		80	18.0	1.6	0.4	350	360	Both had head retraction and were cured
to 16. vii. 30	8					265	300	
to 17. ix. 30	17							
		SPINACH				No. 24 380	No. 70 390	
10. x. 28		50	47.4	2.6	0	330	365	Both birds had head re- traction and were cured
to 28. xi. 28	7							
						No. 67 375	No. 50 320	
7. v. 30		80	18.0	1.7	0.3	230	225	Cock died
to 13. viii. 30	14					—	215	Hen died
to 20. viii. 30	15							
		SPROUTS (BRUSSELS)				No. 68 455	No. 29 350	
16. xi. 27		50	47.5	2.5	0	415	230	Hen died
to 7. xii. 27	3					400	—	Cock had head retraction and died
to 14. xii. 27	4							
		WATER- CRESS				No. 17 495	No. 45 315	
4. vi. 30		80	18.0	1.7	0.3	395	330	Cock lost weight and re- covered. Hen laid 4 eggs; deserted
to 13. viii. 30	10					455	385	
to 10. xii. 30	27	70	27.5	2.0	0.5	290	280	Cock had head retraction and was cured
to 18. iii. 31	14					—	325	Hen died with large heart
to 20. v. 31	23							

Table III. *Vegetables, roots and tubers.*

Date	Time in weeks	Diet				Weights, g.		Remarks
		ARTI- CHOKES	White flour	Fish- meal	Cod- liver oil	Cock No. 38	Hen No. 74	
23. xi. 27 to 11. i. 28	7	50	47.5	2.5	0	450	390	
11. i. 28						325	245	Cock died. Hen had head retraction and died
11. i. 28 to 28. iii. 28	11	70	28.5	1.5	0	No. 330 430	No. 35 440	
28. iii. 28 to 2. v. 28	16					410	400	Both looked ill
2. v. 28						320	325	Cock had head retraction and was cured. Hen paralysed and was cured
28. xi. 28 to 13. iii. 29	15	80	19	1	0	No. 61 450	No. 62 425	
13. iii. 29 to 5. vi. 29	27					325	405	Cock had head retraction and died
5. vi. 29						—	325	Hen for last weeks ate from 2 to 16 g. only each day
BEETROOT						No. 26/28 460	No. 26/30 520	
14. xi. 28 to 19. xii. 28	5	50	47.5	2.5	0	385	325	Cock had head retraction and was cured
19. xii. 28 to 16. i. 29	9					—	245	Hen had head retraction and died
CARROTS						No. 26 475	No. 78 455	
2. i. 29 to 30. i. 29	4	50	47.5	2.5	0	320	220	Cock had head retraction and was cured. Hen had head retraction and died
LEEKS						No. 38 345	No. 44 435	
31. x. 28 to 27. ii. 29	17	50	47.5	3.5	0	275	525	Cock died
27. ii. 29 to 20. iii. 29	20					No. 72 400	470	New cock
20. iii. 29 to 24. iv. 29	25					290	380	Hen had head retraction and died
24. iv. 29 to 5. v. 29	27					245	—	Cock was paralysed and died
16. x. 29 to 18. xii. 29	9	60	37.5	2.5	0	No. 337 415	No. 38 305	
18. xii. 29 to 15. i. 30	13					420	305	Cock escaped
15. i. 30						—	245	Hen had head retraction and was cured
8. i. 30 to 19. ii. 30	7	60	37.5	2.5	0	No. 84 590	No. 2 310	
19. ii. 30						415	230	Cock had head retraction and died. Hen was paralysed and died

Table III. *Vegetables, roots and tubers (contd.).*

Date	Time in weeks	Diet				Weights, g.		Remarks
		LEEEKS	White flour	Fish- meal	Cod- liver oil	Cock No. 19	Hen No. 20	
19. ii. 30 to		80	18.5	1.5	0	450	375	
19. iii. 30 to	4	80	18.0	1.6	0.4	490	385	
2. vii. 30 to	19					350	275	Leeks more fibrous Hen had head retraction and was cured
9. vii. 30	20					310	—	Cock had head retraction and was cured
ONIONS						No. 38	No. 82	
8. v. 29 to		50	47.5	2.5	0	375	360	
17. vii. 29	10					245	255	Birds ill in 5th week Hen had head retraction and died. Cock was para- lysed and died
PARSNIPS						No. 331	No. 28	
21. xii. 27 to		50	47.5	2.5	0	455	470	
7. iii. 28 to	11					330	335	Hen was paralysed and died
6. vi. 28	24					245	—	Cock had head retraction and died
						No. 24	No. 70	
2. i. 29 to		70	28.4	1.6	0	410	435	
6. iii. 29 to	9	50	47.5	2.5	0	410	450	
27. iii. 29	3					320	345	Hen had head retraction and was cured. Cock was very ill
						No. 81	No. 13	
1. v. 29 to		50	47.5	2.5	0	380	320	
17. vii. 29 to	11					245	295	Cock had head retraction and was cured
18. ix. 29	20					—	225	Hen died
						No. 56	No. 14	
31. x. 28 to		60	38.0	2.0	0	430	430	Started with 2 squabs which died. Hen laid 6 eggs
15. v. 29 to	28					350	395	Cock had head retraction and was cured
29. v. 29	30					375	365	Both well
						No. 92	No. 91	
1. v. 29 to		60	38.0	2.0	0	420	385	Two squabs hatched but showed head retraction in 13th week
18. ix. 29 to	20					315	240	Hen laid 3 eggs. Loss of weight from poor dry parsnips. Recovered on fresh parsnips
13. xi. 29	28					410	355	

Table III. *Vegetables, roots and tubers (contd.).*

Date	Time in weeks	Diet				Weights, g.		Remarks
		POTATOES	White rice	Fish- meal	Cod- liver oil	Cock No. 24/17	Hen No. 24/16	
10. ix. 24 to 31. xii. 24	16	97.3	0	2.7	0	385	370	
25. iii. 25 to 17. vi. 25	12	82.5	16.5	1.0	0	385	415	Both well
5. viii. 25 to 9. ix. 25	7	79.2	19.8	1.0	0	410	470	Four eggs laid by hen
	12	98.8	0	1.2	0	320	285	
						395	240	Hen died
						240	—	Cock died
						No. 25/8	No. 25/12	
23. ix. 25 to 14. x. 25	3	99.0	0	1.0	0	385	380	
3. iii. 26 to 12. v. 26	20	82.4	16.5	1.1	0	460	430	
14. vii. 26	39					445	440	
						395	205	Hen died
						230	—	Cock died
						No. 5	No. 4	
16. vi. 26 to 3. xi. 26	20	99.0	0	1.0	0	405	425	Four eggs during first 5 weeks
23. ii. 27	36					505	445	
			White flour			480	430	
5. xii. 28 to 30. i. 29	8	70.0	28.5	1.5	0	No. 23 425	No. 50 480	
						340	400	Both had head retraction. Cock died; hen was cured
						No. 37	No. 338	
16. x. 29 to 8. i. 30	12	80	17.5	2.5	0	420	390	
9. iv. 30	25					315	310	Cock had head retraction and died
						—	315	Hen had head retraction and died
						No. 339		
19. ii. 30 to 7. v. 30	11					365	—	
						315	—	Had head retraction and died
							No. 98	
9. iv. 30 to 11. vi. 30	9					—	335	
						—	235	Had head retraction and was cured
						No. 31	No. 32	
11. xii. 29 to 7. v. 30	21	90	8.6	1.4	0	395	400	
4. vi. 30 to 25. vi. 30	25					395	405	
						255	370	Cock had head retraction and was cured
						—	310	Hen had head retraction and was cured

Table III. *Vegetables, roots and tubers (contd.).*

Date	Time in weeks	Diet				Weights, g.		Remarks
		SWEDES	White flour	Fish- meal	Cod- liver oil	Cock No. 88	Hen No. 407	
18. i. 28						515	405	
to 22. ii. 28	5	50	47.5	2.5	0	295	250	Cock had head retraction and died
to 7. iii. 28	7					—	235	Hen died
		TURNIPS				No. 26	No. 8	
24. x. 28						440	325	
to 21. xi. 28	4	50	47.5	2.5	0	315	240	Cock had head retraction and was cured
to 12. xii. 28	7					—	205	Hen died

The birds were cured by giving a dose of 1 g. of wheat germ, or of marmite.

DISCUSSION.

Fruits. In no case could the pigeons be maintained with the fruit composing 50 % of the diet. With 70 % of the diet composed of fruit maintenance of the pigeons was not longer than from 9 to 11 weeks, except in the cases of orange juice and orange peel. With 80 % of tomatoes the pigeons were maintained for our test period of 26 or more weeks.

The maintenance with orange peel was remarkable as the birds lost weight during the first few weeks and kept at this level for the rest of the test period. The birds ate very little during the whole time. Though the test indicates that orange peel is equal to orange juice in vitamin B₁ value, the general appearance of the birds leads to doubt. We would prefer to suggest that the oil in the rind had some medicinal action. In our experience with autopsies of pigeons which have died from too little vitamin B the intestines have contained dark food mixed often with bile. There have usually been signs of decomposing food in the intestines and it is possible that the essential oil of the orange peel has prevented decomposition and the birds have not been poisoned by a toxin. Such poisoning is a possible cause of the symptom of head retraction. Vitamin B₁ acts by preventing the formation of the toxin from stagnant food in the gut. Evans and Lepkovsky [1929] have noted a sparing action of fat on the requirement of vitamin B₁, and Plimmer, Rosedale and Raymond [1927] found that the fat of the diet required balancing by vitamin B. The fat may have acted partly as lubricant preventing stagnation of the food in the gut. Of the various roots which we have tested parsnips have shown the highest value. These vegetables contain a peculiar essential oil. The vitamin B₁ values of fruits are very small.

Vegetables, leaves. There does not appear to be any similarity in the values of the green leaves. Pigeons were maintained on the diet with 80 % of cabbage and 80 % of watercress. Lettuce and spinach at 80 % and 70 % failed to secure maintenance for 26 weeks. Brussels sprouts were not tested

above 50 %, as this amount indicated very little vitamin B₁. Fresh runner beans probably contain the vitamin B₁ in the seed and not in the green pod, which forms the bulk of the edible matter of fresh beans.

In general, vegetable leaves have a better vitamin B₁ value than vegetable roots and fruits.

Vegetables, roots and tubers. Of the roots and tubers tested, artichokes, leeks, parsnips and potatoes contain some vitamin B₁. Beetroot, carrots, swedes and turnips contain very little. Parsnips at the level of 60 % maintained the pigeons, but the value may be due partly to the essential oil.

The experiments with potatoes were rather variable. At first it seemed that the pigeons could be maintained on 80 % with white rice, but on re-testing with white flour 90 % was scarcely sufficient. The potatoes were tested in different years, and it is very likely that vegetables vary slightly according to the season. The water content of vegetables is higher in wet seasons [Plimmer, 1921] and accordingly there may be a variation in vitamin B₁ value. Young and old samples, as observed with parsnips, would also give a variation in vitamin B value. Another variation may arise from the soil in which the vegetables are grown, and whether the soil has been manured or not manured [cf. McCarrison, 1926; Rowlands and Wilkinson, 1930], as well as the kind employed.

Regarding the value of vegetables and fruits as a source of vitamin B₁ in the general human dietary, our results do not indicate that they have any important value. In order to supply sufficient vitamin B₁ from 60 to 80 % of the diet must be composed of these foodstuffs in the fresh state, amounts which are impossible for man to consume. On the average the consumption of fruits and vegetables is from 4 to 8 oz.; only potatoes may form a considerable part of the human daily diet (from 1 to 2 lb.). The requirement of man for vitamin B₁ is probably not the same as that of the pigeon, and even if it is the same as that of the rat as estimated by Plimmer, Rosedale and Raymond [1927] the amount of vegetable usually eaten by man is not alone enough for his vitamin B₁ requirement.

SUMMARY.

In comparison with cereals and pulses, fresh fruits and vegetables have a much lower vitamin B₁ value, but if allowance be made for their high water content, the comparison is more favourable. Table IV (p. 1799) shows the water content, percentages of wet and dry material in the diets, maintenance figure (+ or -) and comparative vitamin B₁ values with dried yeast, our standard, cereals and pulses.

It is difficult to compare these figures with those of the other workers with rats. On the whole they correspond fairly closely in relation to dried yeast, being from 1/5th to 1/10th the value of this material [see Roscoe's comparison, 1930].

Table IV.

	Water content %	Percentage amount in diet		Main- tenance	Comparative vitamin B ₁ value	
		Wet	Dry		Wet	Dry
Dried yeast	0	.	4	+		100
Cereals	.	.	40	+		10
Pulses	.	.	30	+		13
<i>Fruits:</i>						
Apple	85.3	50	13.0	-		
		80	37.0	-		
Banana	70.8	50	22.5	-		
		70	40.0	-		
Currants, red	85.7	50	12.6	-		
„ black	80.8	70	31.0	-		
Gooseberries	89.3	50	10.0	-		
Grapes	84.7	70	26.0	-		
Orange juice	87.0	50	11.5	-		
		70	23.0	+	6	20
„ peel	78.9	50	18.0	-		
		70	33.0	+	6	13
Plums	85.7	50	13.0	-		
Rhubarb	94.4	50	5.0	-		
Strawberries	90.1	50	9.0	-		
Tomatoes	93.5	50	6.0	-		
		70	14.5	-		
		80	20.7	+	5	20
<i>Vegetables, leaves:</i>						
Beans, runner	93.2	50	12.0	-		
Cabbage	88.0	50	11.0	-		
		70	22.0	-		
		80	32.4	+	5	13
Cauliflower	90.2	50	16.4	-		
Celery	93.7	50	11.0	-		
Kale	83.3	50	14.4	-		
		70	28.0	-		
Lettuce	95.4	50	4.4	-		
		80	15.6	-		
Spinach	92.8	50	6.7	-		
		80	22.5	-		
Sprouts	88.3	50	11.0	-		
Watercress	93.9	70	12.5	-		
		80	20.0	+	5	20
<i>Vegetables, roots etc.:</i>						
Artichokes	79.7	50	17.0	-		
		70	32.0	-		
		80	45.0	+	5	9
Beetroot	90.2	50	17.0	-		
Carrots	87.0	50	11.5	-		
Leeks	85.3	50	12.9	-		
		60	18.0	-		
		80	37.0	+	5	10
Onions	94.2	50	5.5	-		
Parsnips	72.6	50	21.3	-		
		60	35.0	+	7	12
Potatoes	80.5	70	31.0	-		
		80	44.0	-		
		90	64.0	+	4	7
Swedes	88.8	50	10.0	-		
Turnips	93.0	50	6.5	-		

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