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BIRTH WEIGHT- AND BIRTH LENGTH STANDARDS ON BASIC OF THE DATA OF INFANTS BORN ALIVE IN 1973-78

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CONTENTS

INTRODUCTION

The immediate and correct statement on the development of newborn is one of the main conditions for the provision of adequate care for the newborn after birth.

The development standards of birth weight and birth length help to define the development of newborn.

Till now in Hungary the so-called Colorado or Denver standard developed by Lubchenco, L. O. et al. /1963/ has been the most popular but also the so-called Pécs standard elaborated by Fekete, M. et al. /1968/ as well as the so-called Debrecen standard developed by Bazsó, J. et. al. /1968/ have been used frequently.

Because of its important role played in ascertaining of the development of newborn it seemed necessary to develop a standard of reference value, on the one hand based on national data, on the other hand giving a reliable starting point also for the ascertainment on the development of weight and length of newborn deriving from pregnancies of a short duration. The standards of birth weight and birth length developed by the author meet these above requirements; these standards were prepared on basis of the birth data of Hungary of six years: 1973, 1974, 1975, 1976, 1977 and 1978. The standard developed with percentile method contains the data of 1 059 922 newborn deriving from live births.

The programme of the processing of the 1973-78 birth data by computer was prepared by Imre Nagy and Mrs. Gy. Nádházi, of the Computing Centre of the Hungarian Central Statistical Office. The computer programme of the calculation of the percentiles was developed by Éva Gárdos, mathematician of the Population Statistics Section of the Hungarian Central Statistical Office. The author expresses his gratitude for their valuable work. He also thanks Dr. András Klinger, Chief of the Population Statistics Department of the Hungarian Central Statistical Office for having kindly provided the birth data of six years for the study.

I. PURPOSE, OBJECT, THEORETICAL BASIS OF THE SURVEY

1. Purpose of the surveys concerning the development of newborn

The ascertainment of the development of newborn - as in general all evaluations - is based on the comparison to certain data considered as reliable. The parameters used in general for stating the development of newborn are the birth weight, duration of pregnancy /gestational age/ and the body length at birth. The standards elaborated on basis of these parameters permit a rapid judgement of the development degree of newborn.

For obstetricians, neonatologists the newborn's weight, body length and the duration of pregnancy - but especially the interrelation of these parameters which may be called briefly the development of newborn - indicate, on the one hand, whether the nutrition of the foetus was adequate, whether it was not under some /harmful/ impact - affecting its development - during its intrauterine life.

For example, the toxaemia of the mother or the troubles in intrauterine nutrition produce a low birth weight, the diabetes of the mother, however, contributes to the development of a foetus having a high weight as compared to the duration of pregnancy.

On the other hand, the weight and body length at birth compared to the gestational age indicate for the neonatologist what kind of provision is needed in a given case. E.g. for the newborn of a low birth weight as compared to the gestational age the risk of the development of hypoglycaemia is surely greater than for the newborn whose weight corresponds to their gestational age. Lubchenco, L.O. et al. /1963/, Largo, R.H. et al. /1980/, Fekete, M. et al. /1968/, Mestyán, Gy., Fekete, M. /1969/.

The birth weight and birth length values of the newborn deriving from pregnancies ending pre-term - before the completion of the 37th week of pregnancy - /as it was also indicated by North, A.F. /1967// correspond only approximately to the degree of the intrauterine physiological development. Namely, a great part of the direct or indirect causes of the pre-term interruption of pregnancy - the harms - exerting an influence for a shorter or longer period already before the cessation of pregnancy affects /may affect/ negatively the development, growth of the foetus. This fact must be taken into consideration at the use of the development standard of newborn. Thus the development standard of newborn is not apt to give an exact value retrospectively regarding the actual foetal weight and length of a given earlier gestational period of a newborn deriving from a physiological pregnancy ended in term, between the 37th and 42nd weeks. In this context the development standard values of newborn - for lack of more exact data - may be used only with an informative character. It can be used, however, in a reliable way for ascertaining stating the development of the body of newborn deriving from a pregnancy ceased at any time after the 20th week of gestation. Namely in such a case the values of the body weight and body length of a newborn whose birth occurred at a given week of pregnancy /e.g. at the 30th week of gestation/ are compared to the

average value of the newborn delivered at the corresponding gestational week of the standard /e.g. at the 30th week/ or to their percentiles.

The standard values must be based on a great number of data of liveborn also between the 20th and 30th weeks of pregnancy; this is very important. Namely the proportion of liveborn in the individual gestational weeks grows gradually from the 20th week to the 34th week /from 0.03 per cent to 1.10 per cent/, then from the 35th week on it increases very much /the 35th week it is 1.2 per cent, the 40th week 44.6 per cent/.

Thus it is obvious that e.g. a standard developed from the data of ten thousand newborns of the 25th gestational week has been derived from 10 liveborns only. Naturally, such a low number of cases - and even a frequency which is much higher but less than 100 - cannot provide a reliable value - as a part of the standard or percentile table - for the ascertainment of the development of newborn.

2. Earlier surveys concerning the development of newborn, development standards of newborn

The physical development - change in the body measures - of newborn were studied with scientific methodology the first time by Quetelet, A. in the middle of the last century. In Hungary the first scientific paper on the physical development of the newborn was written by Kontsek, B. /1936/. His special merit is that he did not study in itself the development of the different body measures of 1 000 newborns but he also analysed the correlation between the change in the different body measures, on the one hand, and the parity, age of parents, body height of mother and the social conditions, on the other hand.

Also the papers of Acsádi, Gy. /1959/ and Eiben, O. /1960/ concerning the body measures of newborn are worth mentioning.

The first standard of physical development elaborated with percentile method was prepared by Stuart, H.C. and Meredith, H.V. /1946/ regarding the development of five body measures of 5-18 year old children.

The standard of growth in the intrauterine weight, length and circumference of head was elaborated the first time by Hosemann /1949/. After this many development standards of newborn were published, the more important ones are as follows: standards developed by Lubchenco, L.O. et al. /1963/, Lubchenco, L.O. et al. /1966/, Gruenwald, P. /1966/ and Naeye, R.L. et al. /on basis of the birth data of twins/ /1966/, Largo, R.H. et al /1980/. In Hungary Bazsó J. et al. /1968/ and Fekete, M. et al. /1968/ prepared standards. On an international scale as well as in Hungary the standard developed by Lubchenco, L.O. and his collaborators is used the most frequently; in literature it is often mentioned as Colorado or Denver standard.

3. Some measures ascertaining of the development of newborn

The practical realization of the proposal of Yllpo, A. published in 1919 - according to which a newborn of a birth weight of 2500 g or lower should be considered as a premature infant - was the first objective measure for the routine ascertainment of the newborn's development. In fact the above criterion of prematurity became valid in general since the year 1948 when this qualification was adopted by the World Health Organization /WHO 1948/. The general increase in the level of health provision and within this the favourable results of prenatal care, obstetrical and neonatological provisions permitted and even required to prepare measures, recommendations providing more and more exact ascertainments of the development of newborn. Thus in 1950 the WHO issued a proposal on the concept of live birth /WHO 1950/. At the suggestion of the WHO in 1961 the children of a birth weight under 2500 g were called instead of "premature" babies low birth weight infants /WHO 1961/.

According to the order of the Ministry of Health as of 1 January 1971 the gestational age of the child /the duration of pregnancy/ - the period which the foetus passed in the mother's uterus before birth - must be stated and registered in weeks /Népmozgalmi kézikönyv / Handbook of Vital Statistics/ /1971/.

4. Description of some foreign and Hungarian development standards of newborn

The reason for the general spreading of Lubchenco's standard was that it was the first percentile standard which could be used well. The present validity of the standard, having been accepted widely at the time of its elaboration, is challenged presently in Hungary. Furthermore, it has been argued against its validity that 30 per cent of the newborns in the sample are of Hispano-American by origin. To put it differently: the standard was derived from data valid mainly for children were born under unfavourable health and socio-economic circumstances /Lubchenco, L.O. et al. /1963//.

The standard of Gruenwald, P. /1966/ was prepared by using the average $\pm$ 2 SD, and the nearly 14 000 data contained also the figures relating to stillborn babies. Thus this standard is not suitable for the ascertainment of the development of liveborn.

The almost simultaneous elaboration of the Debrecen standard of Bazsó, J., Vachter, J., Lányi, I. /1968/ and of the Pécs standard of Fekete, M., Igazi, K., Járai, I., Lajos, L., Mestyán, Gy., Waszner, Zs. /1968/ was a very useful, stop-gap initiative. The limited possibilities explain the deficiency of these standards. The newborn of both standards derive from the regional health districts of teaching hospitals of obstetrics. In the case of the Pécs standard it was developed having used the data from the health district of the municipal hospital Mohács - so they are mainly of local validity. Another limit of the applicability is - not only regarding these two Hungarian but also concerning all standards

developed till now - the small number of cases at the gestational weeks of low serial numbers. Table 1. illustrates the number of newborn at the individual gestational weeks of the standard prepared by some foreign and Hungarian authors. Taking into consideration the statement of Hajtman, B. /1971/ according to which "if the sample size is under 100, it has no sense to speak of centile /percentiles/[1]" we can state that a number of cases over 100 at a pregnancy duration under the 30th week can be found only in Lubchenco's standard; and even there only at the 28th and 29th weeks.

The situation is even more unfavourable in case of percentiles developed separately for the two sexes because in this case about half of the values illustrated in Table 1. can be indicated - by sex - for the individual gestational weeks.

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[1] Adopting the name used by Köves P., Párniczky, G.: percentile.

1. Number of newborn included in the development standards of newborn developed by different authors

Duration of pregnancy (gestational age) in weeks	Number of newborn included in the development of the standard (both sexes together)					
	Lubchenco, L.O. et al. /1963/ 1948-61	Gruenwald, M.D. /1966/	Fekete, M. et al. /1968/ 1966-67	Bazsó, J. et al. /1968/ 1961-66	Largo, R.H. et al. /1980/ 1969-74.	Joubert, K. /material of this publication/ 1973-78
-2o						3o1
21						9o
22						349
23						25o
24	24			32		1 721
25	27			3o		9o7
26	68			36		2 o63
27	72			47		1 494
28	118	34		53	11	7 281
29	143	44		57	9	2 346
3o	1o9	6o	14	6o	14	6 466
31	147	76	18	52	15	3 315
32	124	123	25	79	19	11 487
33	118	112	29	82	2o	5 o61
34	145	172	36	97	43	11 66o
35	188	277	54	17o	63	13 o72
36	2o2	44o	1o4	266	95	85 o22
37	372	816	176	44o	119	42 413
38	636	1 754	363	746	329	121 193
39	1 o1o	2 441	627	1 547	778	156 o72
4o	1 164	3 o85	8o2	2 o42	1 415	472 211
41	632	1 972	491	1 354	1 2o4	78 oo4
42	336	1 23o	256	497	713	32 121
43		4oo	1o9		24o	5 o23
44 -		291			35	
	5 635	13 327	3 1o4	7 687	5 122	1 o59 922

II. MATERIAL AND METHOD

1. Material of the survey

In this work the birth data of liveborn of Hungary for the years 1973, 1974, 1975, 1976, 1977 and 1978 were processed.

The analysis used the replies given to the following questions of the birth record:

- Date of birth
- Permanent residence of the mother
- Sex of the child
- Viability of the child
- Weight /g/, length /cm/ of the child
- Gestational age of the child /duration of pregnancy/ in weeks
- Has the child any anomaly?
  If so, indicate the anomalies.

The "Birth record" which is filled in on each live- or stillborn infant in Hungary - thus representing a part of the full-scope data supply - serves as basis for birth statistics at the Hungarian Central Statistical Office.

The "Birth records" arrived to the Population Statistics Section of the Hungarian Central Statistical Office during six years registered the data of altogether 1 067 891 liveborns /Demográfiai Évkönyv/Hungarian Demographic Yearbook, 1979/. For elaborating the development standard of newborn, the data of 1 059 922 newborn were processed. From the data of 7 969 newborn which were not processed for the standard we had to omit 5 405 data because of some anomaly of the newborn. The data of 2 564 newborn could not be processed because one of the three most improtant data - body weight at birth, body length at birth and duration of pregnancy - was not indicated or proved to be wrong. Here it should be mentioned that for the elaboration of this standard only the data of liveborn having no anomaly were used.

Concerning the way of measuring, determining the three basic data used for the elaboration of the standard - as these were full-scope, national data - some statements of general validity can be made. The body weight of newborn - according to the prescription - is weighed after the delivery and is indicated in grammes.

The body length of newborn is measured in a very various way. As measuring device different instruments are used, beginning with the less exact linen measuring tape, through the measuring trough /used most frequently/ to the reliable and exact measuring table of Holtein system /of which, unfortunately, only very few are available/. The body length of newborn is indicated in centimetres.

The duration of pregnancy[2] /gestational period, gestational age of the child, pregnancy age/ is calculated from the first day of the last regular menses - if the value of the duration of pregnancy which can be stated in this way corresponds to the maturity, physiological development of the newborn - and is indicated in completed weeks.

Table 2 illustrates the distribution by sex of liveborn infants used for the preparation of the standard. In respect of the development of the proportion of female and male newborn the attention must be drawn to the following statements. Of the liveborn infants during the examined six years 51.40 per cent were males and 48.60 per cent females. According to this the so-called secondary sex ratio /SR/ - illustrating the ratio of male infants to the total number of infants born /in a non-percental form/ is in this case SR = 0.5140. This value corresponds well to the world average - which is 0.5146 /i.e. the ratio of males is 51.46 per cent/. The SR value stated by Rex-Kiss, B., Szemere, Gy. and Szabó, R. /1977/ on basis of the birth data of 29 years is equal to 0.5169, which is already by 0.0029 higher than the SR value of the years 1973-1978. Studying the sex ratio by gestational weeks we can state in eight cases a female surplus, differently from the general situation.

Examining the rates by sex for the individual gestational weeks we find no great difference in the percental values for the given week between the female and male newborn.

Besides, studying the percental rates by duration of pregnancy we see - which can be stated unanimously also from the distribution by number - that in the even weeks and especially in the even weeks which can be divided by four the number of births cumulates. The phenomenon observed by the author at the study of the 1975 birth data and described in No. 1/1979 of the journal Demográfia /Joubert, K. 1979/ - the reason of which is that many obstetricians calculate the duration of pregnancy traditionally in lunar months - could be stated even in 1978 according to the lessons drawn from the material of the survey.

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[2] The duration of pregnancy is the period indicated in weeks which was spent by the foetus in the uterus of the mother before birth /Népmozgalmi kézikönyv/Handbook of Vital Statistics, 1971/.

2. Distribution of the examined newborn by sex

Duration of pregnancy /weeks/	Females	Males	Together	Females	Males	Together	Females	Males	Together
	Number			Percental distribution					
				By sex			By duration of pregnancy		
-2o	157	144	3o1	52,16	47,84	1oo,oo	o,o3	o,o3	o,o3
21	39	51	9o	43,33	56,67	1oo,oo	o,o1	o,o1	o,o1
22	167	182	349	47,85	52,15	1oo,oo	o,o3	o,o3	o,o3
23	118	132	25o	47,2o	52,8o	1oo,oo	o,o2	o,o3	o,o2
24	867	854	1 721	5o,38	49,62	1oo,oo	o,17	o,16	o,16
25	459	448	9o7	5o,61	49,39	1oo,oo	o,o9	o,o8	o,o9
26	1 o13	1 o5o	2 o63	49,1o	5o,9o	1oo,oo	o,2o	o,19	o,2o
27	721	773	1 494	48,26	51,74	1oo,oo	o,14	o,14	o,14
28	3 558	3 723	7 281	48,87	51,13	1oo,oo	o,69	o,68	o,69
29	1 154	1 192	2 346	49,19	5o,81	1oo,oo	o,22	o,22	o,22
3o	3 142	3 324	6 466	48,59	51,41	1oo,oo	o,61	o,61	o,61
31	1 561	1 754	3 315	47,o9	52,91	1oo,oo	o,3o	o,32	o,31
32	5 774	5 713	11 487	5o,27	49,73	1oo,oo	1,12	1,o5	1,o8
33	2 482	2 579	5 o61	49,o4	5o,96	1oo,oo	o,48	o,47	o,48
34	5 957	5 7o3	11 66o	51,o9	48,91	1oo,oo	1,16	1,o5	1,1o
35	6 552	6 52o	13 o72	5o,12	49,88	1oo,oo	1,27	1,2o	1,23
36	42 351	42 671	85 o22	49,81	5o,19	1oo,oo	8,22	7,83	8,o2
37	2o 6o6	21 8o7	42 413	48,58	51,42	1oo,oo	4,oo	4,oo	4,oo
38	59 46o	61 733	121 193	5o,94	49,o6	1oo,oo	11,54	11,33	11,44
39	75 761	8o 311	156 o72	51,46	48,54	1oo,oo	14,71	14,74	14,73
4o	227 591	244 62o	472 211	48,2o	51,8o	1oo,oo	44,19	44,9o	44,55
41	37 9o1	4o 1o3	78 oo4	48,59	51,41	1oo,oo	7,36	7,36	7,36
42	15 325	16 796	32 121	47,71	52,29	1oo,oo	2,98	3,o8	3,o3
43 -	2 356	2 667	5 o23	46,9o	53,1o	1oo,oo	o,46	o,49	o,47
Total:	515 o72	544 85o	1 o59 922	48,6o	51,4o	1oo,oo	1oo,oo	1oo,oo	1oo,oo

2. Method

Of the mathematical-statistical methods used for processing and analysing the most important were the following.

Author took over the percentile calculation method from Köves, P. and Párniczky, G. /1973/.[3] The percentile values were adjusted by means of so-called moving averages. The averages /arithmetic average or arithmethic mean/ were calculated on basis of individual values - and not on basis of group averages. Beside the average also the standard deviation, /SD/ and the standard error of the mean /$s_{\bar{x}}$/ must be always indicated.

[3]The percentile method is described in detail by the auther in his article, under the same title as this paper, in No. 1/1983 of the journal Demográfia.

III. FINDINGS OF THE SURVEY

1. Purpose of the survey

The purpose of the survey was to develop a standard which knowing the newborn's age of development /gestational age/ informs in a rapid and reliable way the obstetrician, neonatologist on the compatibility of a given newborn's birth weight and birth length with the foetal age /gestational age/. Thus by the birth weight standard the development of the newborn's birth weight and by the birth length standard the development of the newborn's length at birth can be stated.

Using the data of 1 059 922 newborn the author prepared the development standard of birth weight and the development standard of birth length both in table and in graphic forms. The weight values and length values, respectively, belonging to nine percentiles / 3, 5, 10, 25, 50, 75, 90, 95 and 97 / indicated in table form facilitate the more exact evaluation. The percentile curves drawn on basis of the numerical data of the percentiles permit a more simple and more rapid - but less exact - evaluation of the individual data.

The birth weight and birth length standards developed in this way - on basis of the national birth data of six years - are of reference value concerning the development of the weight and length of liveborn infants of Hungary.

According to this the standards are called: Hungarian development standard of birth weight /or national development standard of birth weight/ and Hungarian development standard of birth length /or national development standard of birth length/; hereinafter briefly Hungarian standard or national standard.

2. Development standards of weight

The numerical values of the percentiles of the birth weight standard are illustrated in tables 3., 4. and 5. and are completed with the data of the average weight /$\bar{x}$/, standard deviation /SD/ and standard error of the mean /$s_{\bar{x}}$/.

Table 3. contains the numerical values in grammes of the percentiles of the joint adjusted birth weight of female and male newborn, on basis of these data the percentile curves of the development standard of weight were drawn in Figure I. Similarly on basis of the data of Table 4. the development standard - percentiles - of the weight of female newborn were illustrated in a diagram in Figure II., and on basis of the data of Table 5. - those of the male newborn in Figure III.

Tables 3., 4. and 5. and even more Figures I., II. and III. serve the purpose to give a rapid and reliable information to obstatricians and neonatologists on the development degree of weight as compared to the newborn's gestational age.

In the Hungarian and international literature the weight values corresponding to the 10. percentile and 90. percentile are the lower and upper limits of the weight range considered as "normal" or, more correctly, as physiological. Thus the birth weight values between the two correspond to the gestational age. Birth weight values over the upper limit - 90. percentile - are considered as high as compared to the duration of pregnancy. The birth weight values under the 10. percentile - lower limit - are regarded as low as compared to the gestational age. To indicate the above three categories also the terms "appropriate for gestational age" /AGA/, "small for gestational age" /SGA/ and "large for gestational age" /LGA/ are used /International Classification of Diseases, 1975. Revision /1978//.

3. Comparison of the national development standard of weight to similar standards of other authors

Figure IV. illustrates the classification - described above in detail - of newborn by birth weight and duration of pregnancy, according to the scheme prepared by Battaglia, F.C. and Lubchenco, L.O. /1967/, but naturally with the percentile curves of our own data and with the term limit proposed by the WHO according to which the newborn is pre-term in case of birth before the completion of 37 weeks of gestation. /Namely the American Academy of Pediatrics Committee indicates the limit of preterm and term in 38 completed gestational weeks /American Academy of Pediatrics Committee on Fetus and Newborn 1967/./

Figure V. illustrates the birth weight standards of female and male newborn. The figure only shows the lines of the three most important percentiles - the 10th, 50th and 90th - for the two sexes. We see that in the first four gestational weeks the female newborn have a somewhat higher weight only at the 90th percentile but it cease to exists in the 24th week. Between the 24th and 29th weeks at the 10th and 50th percentiles a surplus weight of males can be stated temporarily which can be scarcely perceived at the 90th percentile, then till the 33rd week the lines of the two sexes have almost the same course at all the three percentiles. From the 34th week on a surplus weight of males increasing more and more is reflected by the course of all the three percentile curves. At the 40th week the difference in the birth weight percentiles between the two sexes is already more than 100 g.

Figures VI., VII. and VIII. compare the course of the weight curves of the 10., 50. and 90. percentiles of the present survey /for both sexes together/ to the corresponding percentile curves of Lubchenco, L.O., Hansman, Ch., Dressler, M., Boyd, E. /1963/, Fekete, M., Igazi, K., Járai, I., Lajos, L., Mestyán, Gy., Waszner, Zs. /1968/ and Bazsó, J., Vachter, J., Lányi, I. /1968/. Looking at the three figures we see the greatest difference in the course of the compared three curve pairs at Lubchenco's standard /Figure VI./.

3. Adjusted birth weight percentiles and birth weight averages of female and male newborn

Duration of pregnancy /weeks/	Percentiles									$\bar{x}$	s (SD)	$s_{\bar{x}}$
	3	5	10	25	50	75	90	95	97			
-20	332	366	420	513	619	755	879	937	962	604	62,63	3,61
21	353	387	443	539	659	818	1 003	1 117	1 190	694	73,81	4,70
22	394	428	489	591	730	921	1 166	1 376	1 511	763	82,24	5,43
23	429	465	533	638	783	983	1 271	1 510	1 666	830	89,25	3,21
24	468	508	582	693	848	1 057	1 362	1 613	1 777	873	93,41	3,02
25	519	562	641	762	930	1 157	1 456	1 696	1 850	968	102,70	2,60
26	576	624	711	851	1 043	1 302	1 609	1 830	1 964	1 044	110,13	2,85
27	649	706	802	965	1 187	1 485	1 804	2 016	2 135	1 233	129,59	2,16
28	732	801	907	1 093	1 340	1 661	1 986	2 195	2 314	1 358	142,07	2,33
29	800	883	1 007	1 225	1 500	1 834	2 164	2 375	2 516	1 554	162,19	2,21
30	883	979	1 122	1 365	1 650	1 978	2 309	2 534	2 702	1 633	169,79	2,67
31	995	1 099	1 257	1 517	1 803	2 115	2 438	2 676	2 862	1 819	188,31	2,24
32	1 116	1 227	1 398	1 669	1 951	2 253	2 568	2 800	2 991	1 937	199,52	2,45
33	1 266	1 383	1 562	1 830	2 105	2 404	2 707	2 923	3 110	2 118	216,88	2,24
34	1 444	1 568	1 749	2 014	2 305	2 617	2 913	3 112	3 286	2 237	228,26	2,29
35	1 629	1 755	1 933	2 200	2 512	2 843	3 145	3 328	3 489	2 515	256,35	1,34
36	1 821	1 944	2 119	2 382	2 701	3 041	3 348	3 523	3 668	2 706	275,27	1,27
37	2 031	2 149	2 315	2 573	2 896	3 238	3 544	3 722	3 850	2 913	295,65	1,03
38	2 222	2 330	2 486	2 738	3 045	3 371	3 670	3 848	3 969	3 006	304,10	0,93
39	2 379	2 482	2 635	2 882	3 168	3 477	3 767	3 942	4 060	3 165	319,58	0,64
40	2 505	2 606	2 760	3 014	3 303	3 607	3 897	4 073	4 193	3 305	333,42	0,69
41	2 564	2 664	2 826	3 091	3 386	3 693	3 991	4 171	4 297	3 396	342,65	0,78
42	2 596	2 699	2 868	3 140	3 446	3 757	4 065	4 249	4 383	3 425	345,77	1,76
43-	2 503	2 614	2 810	3 099	3 404	3 731	4 050	4 250	4 388	3 388	342,43	4,83

4. Adjusted birth weight percentiles and birth weight averages of female newborn

Duration of pregnancy /weeks/	Percentiles									$\bar{x}$	s (SD)	$s_{\bar{x}}$
	3	5	1o	25	5o	75	9o	95	97			
-2o	337	374	427	519	612	764	891	944	966	61o	63,55	5,o7
21	358	396	448	54o	656	818	1 o24	1 129	1 193	698	74,52	6,77
22	397	436	491	582	729	9o7	1 211	1 386	1 516	765	82,7o	7,96
23	427	467	529	627	775	964	1 3o9	1 518	1 686	825	88,78	4,53
24	458	5o2	571	68o	831	1 o4o	1 379	1 616	1 798	859	92,19	4,2o
25	5o2	55o	624	743	9o6	1 134	1 441	1 685	1 853	948	1oo,81	3,61
26	558	6o8	689	829	1 o17	1 278	1 587	1 821	1 961	1 o22	1o8,21	4,oo
27	629	685	781	941	1 164	1 469	1 79o	2 o17	2 135	1 213	127,87	3,o4
28	714	779	889	1 o69	1 321	1 653	1 979	2 2o1	2 318	1 341	14o,82	3,31
29	786	866	994	1 2o4	1 491	1 84o	2 173	2 396	2 532	1 549	162,1o	3,17
3o	871	966	1 114	1 348	1 648	1 993	2 326	2 56o	2 72o	1 634	17o,36	3,86
31	992	1 o94	1 254	1 5o6	1 8o3	2 127	2 449	2 692	2 869	1 821	188,71	3,19
32	1 116	1 222	1 394	1 658	1 949	2 259	2 575	2 8o5	2 986	1 936	199,47	3,49
33	1 266	1 375	1 555	1 817	2 o97	2 398	2 7o3	2 9o6	3 o72	2 1o7	215,7o	3,13
34	1 445	1 558	1 737	1 997	2 284	2 594	2 893	3 o76	3 225	2 22o	226,5o	3,2o
35	1 62o	1 739	1 914	2 176	2 479	2 8o2	3 1o9	3 277	3 416	2 482	252,86	1,87
36	1 8o3	1 924	2 o95	2 351	2 657	2 984	3 293	3 456	3 585	2 662	27o,61	1,78
37	2 oo6	2 126	2 285	2 535	2 842	3 169	3 472	3 643	3 765	2 857	289,88	1,44
38	2 191	2 3o2	2 45o	2 695	2 983	3 296	3 588	3 763	3 879	2 947	298,o2	1,31
39	2 345	2 449	2 593	2 834	3 1o3	3 399	3 679	3 85o	3 964	3 1o2	313,o5	o,9o
4o	2 468	2 568	2 712	2 959	3 23o	3 523	3 8o1	3 971	4 o85	3 233	326,1o	o,97
41	2 525	2 622	2 773	3 o31	3 3o9	3 6o5	3 889	4 o66	4 182	3 317	334,58	1,o9
42	2 553	2 649	2 8o8	3 o73	3 361	3 663	3 96o	4 14o	4 219	3 345	337,6o	2,48
43-	2 468	2 576	2 757	3 o41	3 337	3 641	3 944	4 151	4 278	3 318	335,25	6,91

5. Adjusted birth weight percentiles and birth weight averages of male newborn

Duration of pregnancy /weeks/	Percentiles									$\bar{x}$	s (SD)	$s_{\bar{x}}$
	3	5	10	25	50	75	90	95	97			
-20	327	359	414	503	627	748	860	928	957	597	61,99	5,17
21	349	380	438	534	663	818	971	1 105	1 170	689	73,56	6,56
22	392	423	487	593	734	935	1 147	1 366	1 479	760	82,25	7,46
23	432	467	537	645	794	1 003	1 259	1 496	1 634	836	89,94	4,56
24	476	517	592	706	866	1 075	1 356	1 603	1 760	887	94,79	4,34
25	532	578	657	783	955	1 177	1 465	1 701	1 850	989	104,62	3,74
26	592	645	732	874	1 069	1 320	1 622	1 834	1 967	1 064	112,01	4,07
27	669	729	823	989	1 209	1 495	1 809	2 012	2 132	1 252	131,24	3,05
28	752	821	926	1 116	1 357	1 666	1 985	2 184	2 307	1 373	143,28	3,29
29	817	898	1 021	1 243	1 508	1 829	2 151	2 351	2 500	1 559	162,31	3,10
30	897	988	1 130	1 379	1 651	1 968	2 294	2 506	2 688	1 632	169,33	3,70
31	999	1 102	1 261	1 527	1 803	2 107	2 429	2 657	2 861	1 816	188,00	3,13
32	1 118	1 234	1 404	1 678	1 954	2 250	2 562	2 794	3 004	1 939	199,65	3,45
33	1 267	1 395	1 572	1 842	2 114	2 410	2 713	2 944	3 155	2 129	218,11	3,19
34	1 445	1 582	1 763	2 032	2 326	2 638	2 931	3 151	3 346	2 254	230,06	3,28
35	1 638	1 775	1 957	2 228	2 547	2 880	3 177	3 378	3 554	2 548	259,81	1,92
36	1 837	1 968	2 147	2 416	2 746	3 091	3 395	3 582	3 738	2 750	279,76	1,82
37	2 056	2 177	2 347	2 616	2 953	3 300	3 604	3 785	3 916	2 967	301,14	1,47
38	2 257	2 364	2 525	2 788	3 106	3 437	3 736	3 913	4 035	3 063	309,79	1,33
39	2 421	2 523	2 681	2 937	3 233	3 545	3 836	4 008	4 129	3 225	325,64	0,91
40	2 555	2 655	2 818	3 077	3 373	3 681	3 971	4 145	4 266	3 372	340,17	0,98
41	2 613	2 716	2 891	3 158	3 459	3 771	4 066	4 244	4 371	3 469	349,99	1,10
42	2 652	2 757	2 942	3 212	3 524	3 840	4 143	4 328	4 460	3 498	353,11	2,51
43-	2 527	2 658	2 859	3 157	3 466	3 809	4 111	4 312	4 462	3 449	348,71	6,75

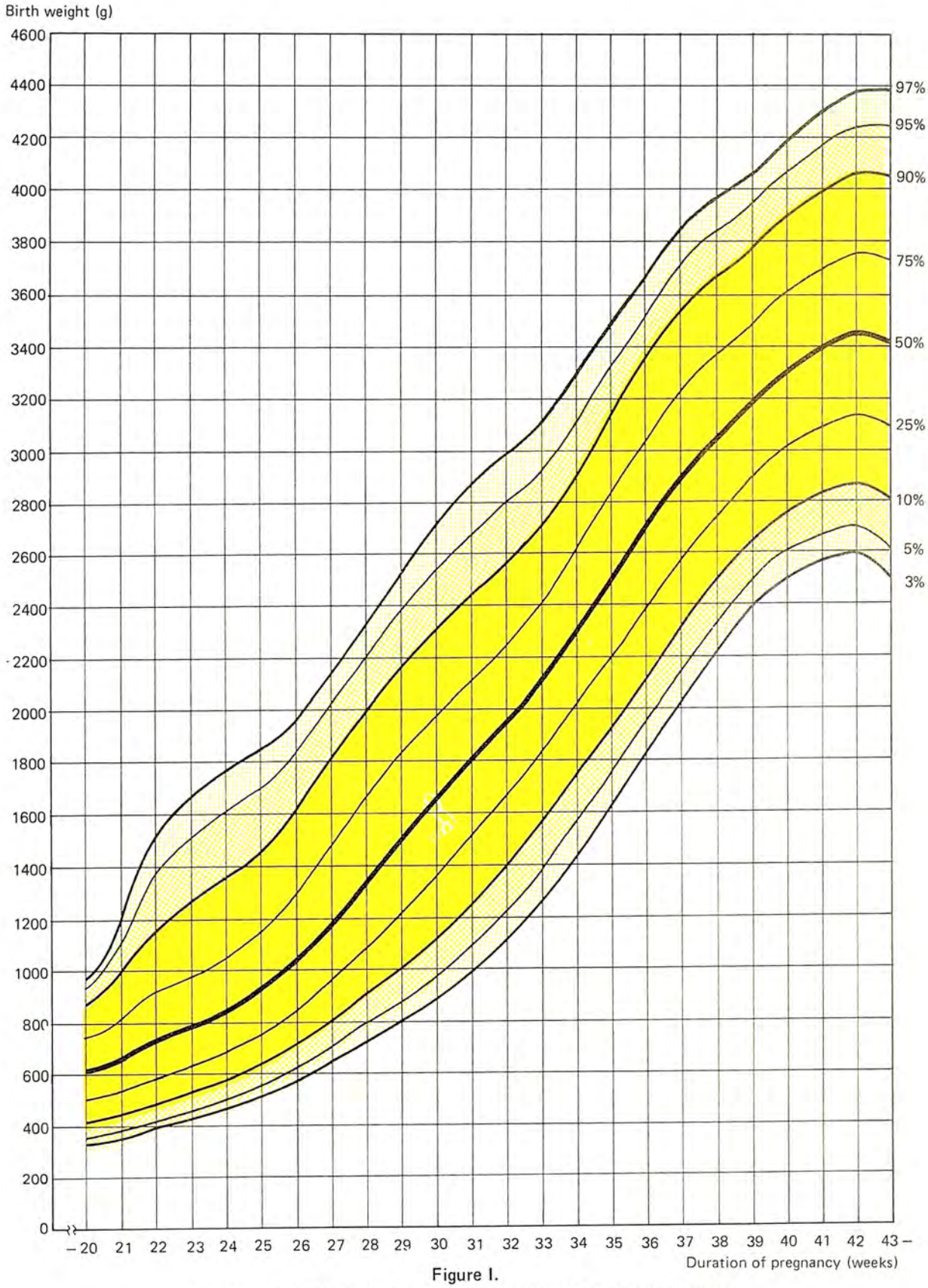


Figure I.
Development standard of body weight of female and male newborn
(Birth weight percentiles)

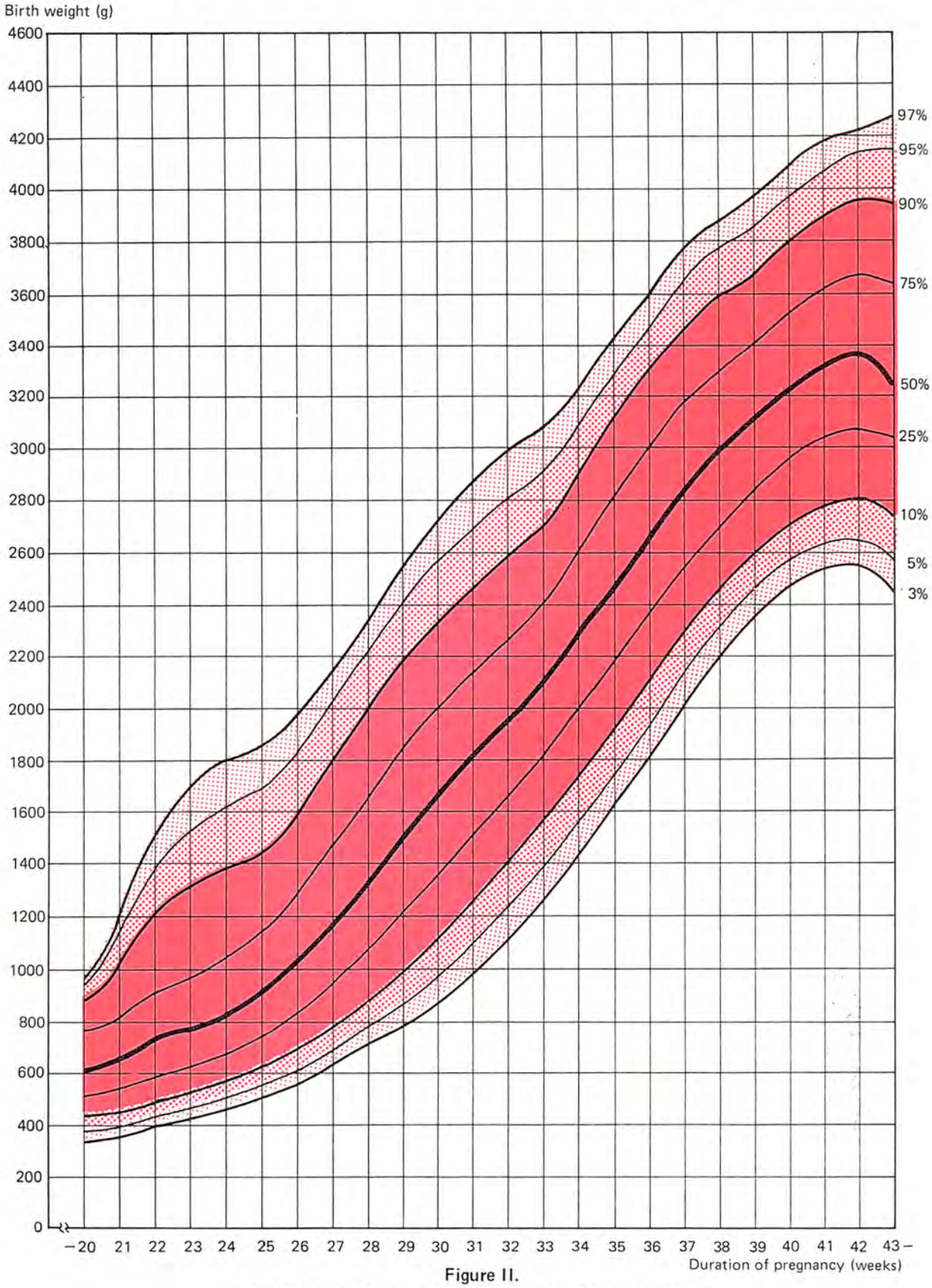


Figure II.
Development standard of body weight of female newborn
(Birth weight percentiles)

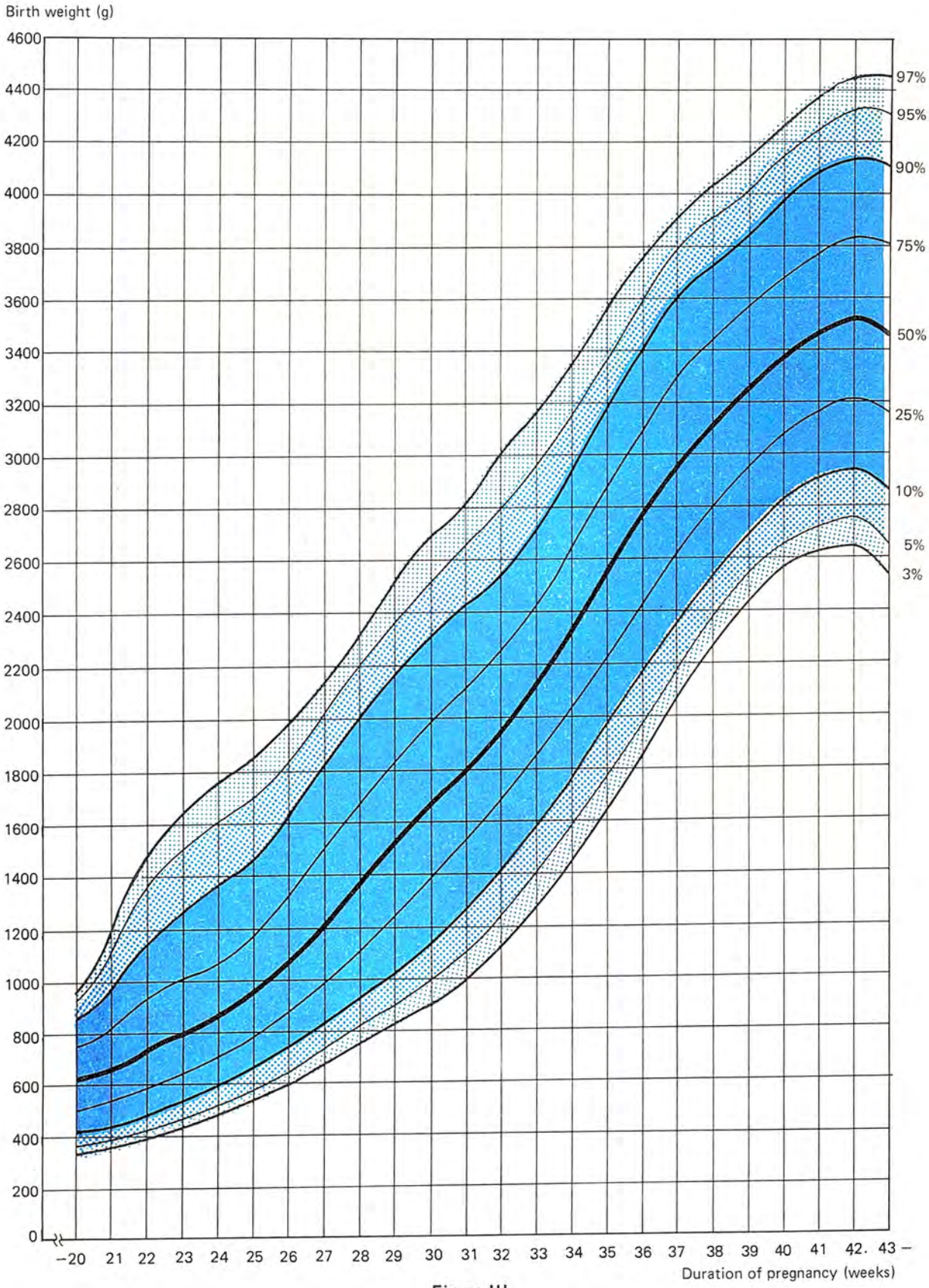


Figure III.
Development standard of body weight of male newborn
(Birth weight percentiles)

The lower percentile values of Lubchenco's standard can be ascribed partly to the fact that a great part of the sample consisted of the newborn of parents living under unfavourable social conditions, and partly that about 30 percent of the babies covered by the sample derived from Hispano-American /Indian-Mexican-Spanish extraction/ parents /Lubchenco, L.O., Hansman, Ch., Dressler, M., Boyd, E. /1963/.

At the comparison of the percentiles of birth weight development determined by Fekete, M. and his collaborators to the identical percentiles of the author's standard /Figure VII./ the following statements can be made. The course of all the three percentile curves of Fekete's standard is under the national curves till the 35th week. From the 36th week on there is no significant difference between the curves of the two standards. The very great difference at pregnancy durations under the 36th week - in case of the 50th and 90th percentiles - is probably caused by the very low number of cases /See: Table 1./.

The 10th percentile of Bazsó's standard is almost identical with the corresponding curve of the national standard /Figure VIII./. The upper section of the curves of the 50th percentile - from the 34th week on - also accords well but in the lower section there is already a great difference between the values of the two curves, but here, too, the deviation is not more than 150 g. As to the course of the 90th percentile in the lower section there is a very great difference, in the 27-28th weeks the course of the curve of Bazsó's standard is by about 400 g lower than the course of the comparative curve. In a part of the upper section of the curve of the 90th percentile Bazsó's curve gets over the comparative curve - from 34 to 37 weeks of gestation - then after a short overlapping it goes under it. In the upper section the difference in the curve values is not more than 100 g, so it is not significant.

Summarizing the difference in the percentile curves - graphed in Figures VI., VII. and VIII. - of three different standards and the author's standard it can be stated that least of all the percentiles of Lubchenco's standard and most of all those of Bazsó's standard accord with the corresponding percentiles of the author's standard.

4. Percental distribution of the newborn examinded by gestational age and birth weight

After the description of the development standard of birth weight - which is the main purpose of this paper - and after its comparison with other standards also the development of the birth weigth and gestational age of the examined newborn within the so-called prematurity limits should be presented. It is important to know the proportion of "premature infants" by weight - correctly of the low-weight babies - and premature infants by duration of pregnancy - those born before the 37th completed week of pregnancy - because these indicators are used in general for the description of the groups of newborn.

Table 6. illustrates the percental distribution of the examined newborn by low-weight and non-low-weight babies /born with a weight of 2 499 g and lower and those born with a weight of 2 500 g and higher/ as well as by infants born pre-term and in term /born the 36th week of pregnancy and earlier as well as born the 37th

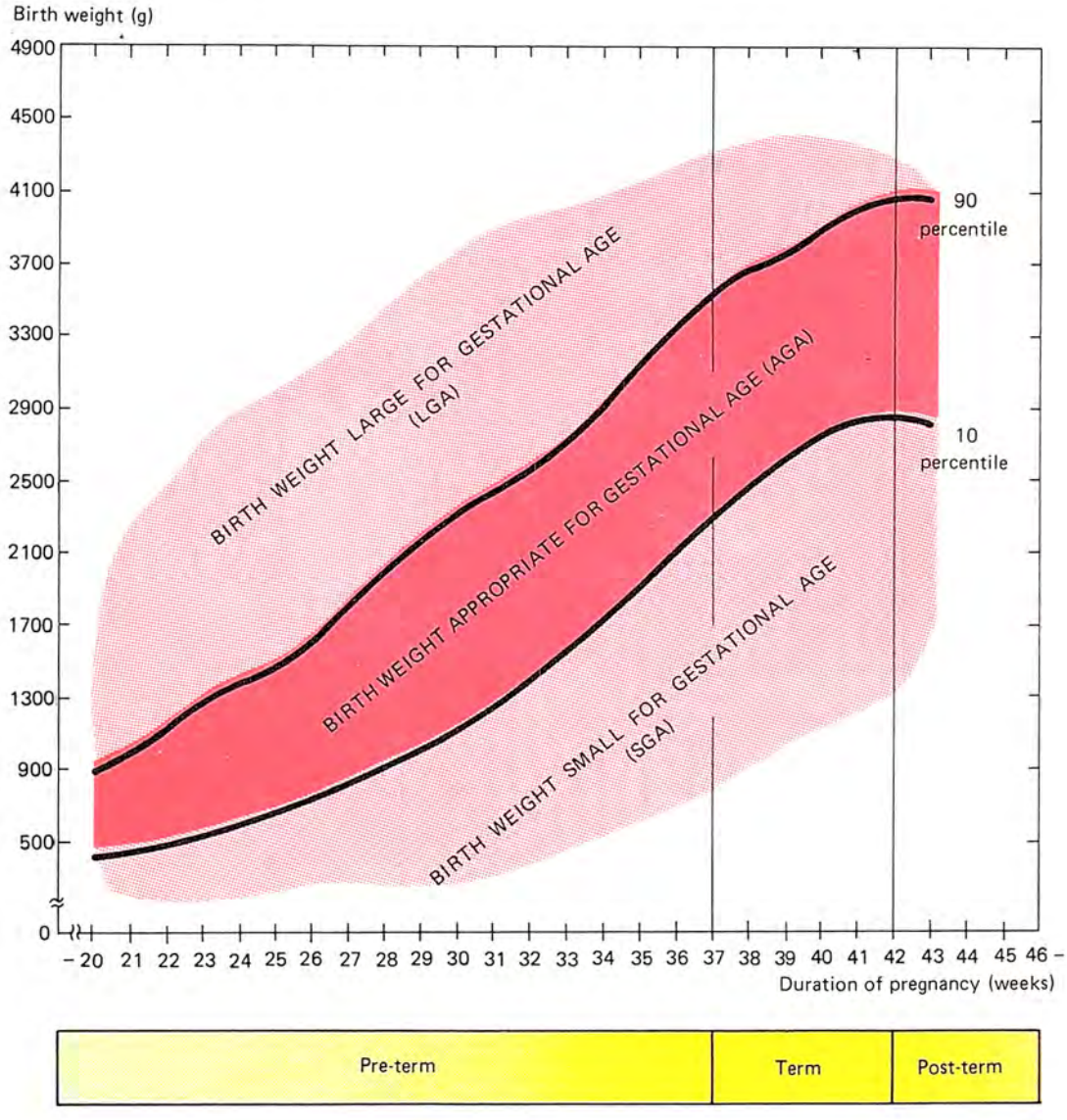


Figure IV.
Classification of newborn on basis of the national birth weight percentile and gestational age
(According to the scheme of Battaglia, F.C. and Lubchenco, L.O.)
(1967)

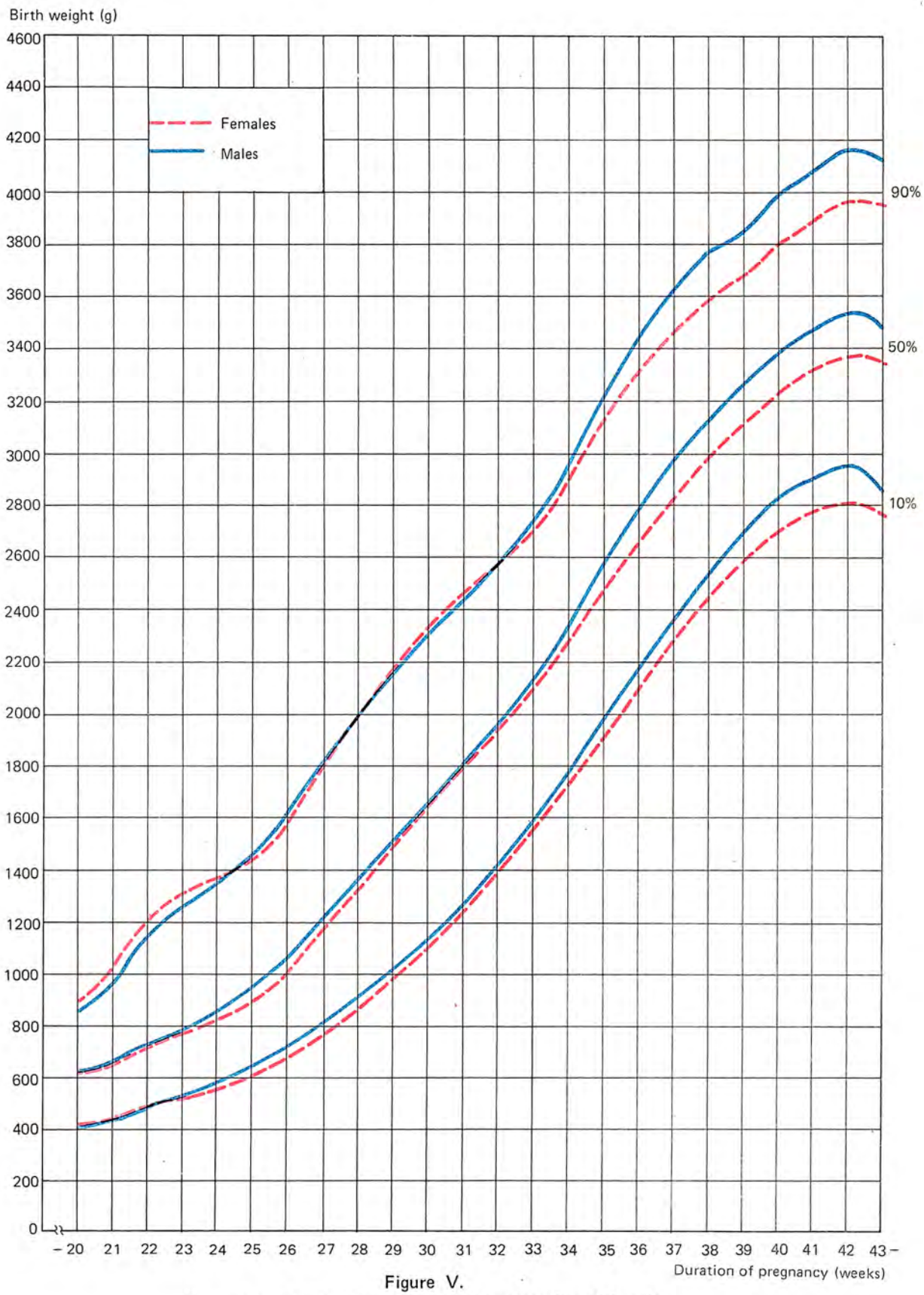


Figure V.
Comparative illustration of the weight percentiles of female and male newborn

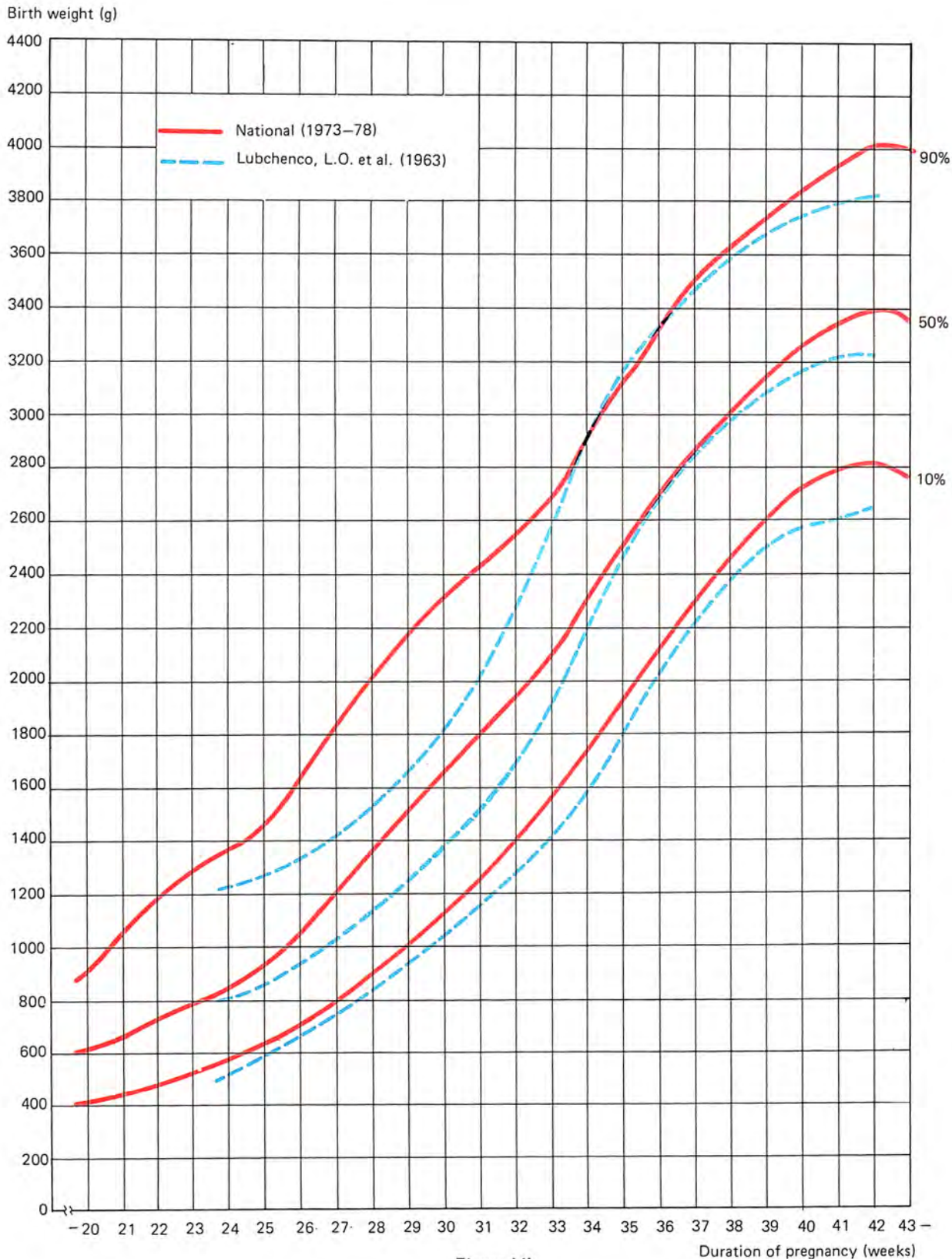


Figure VI.
Comparative illustration of birth weight standards
(Lubchenco, L.O. et al. (1963) and national (1973–78))

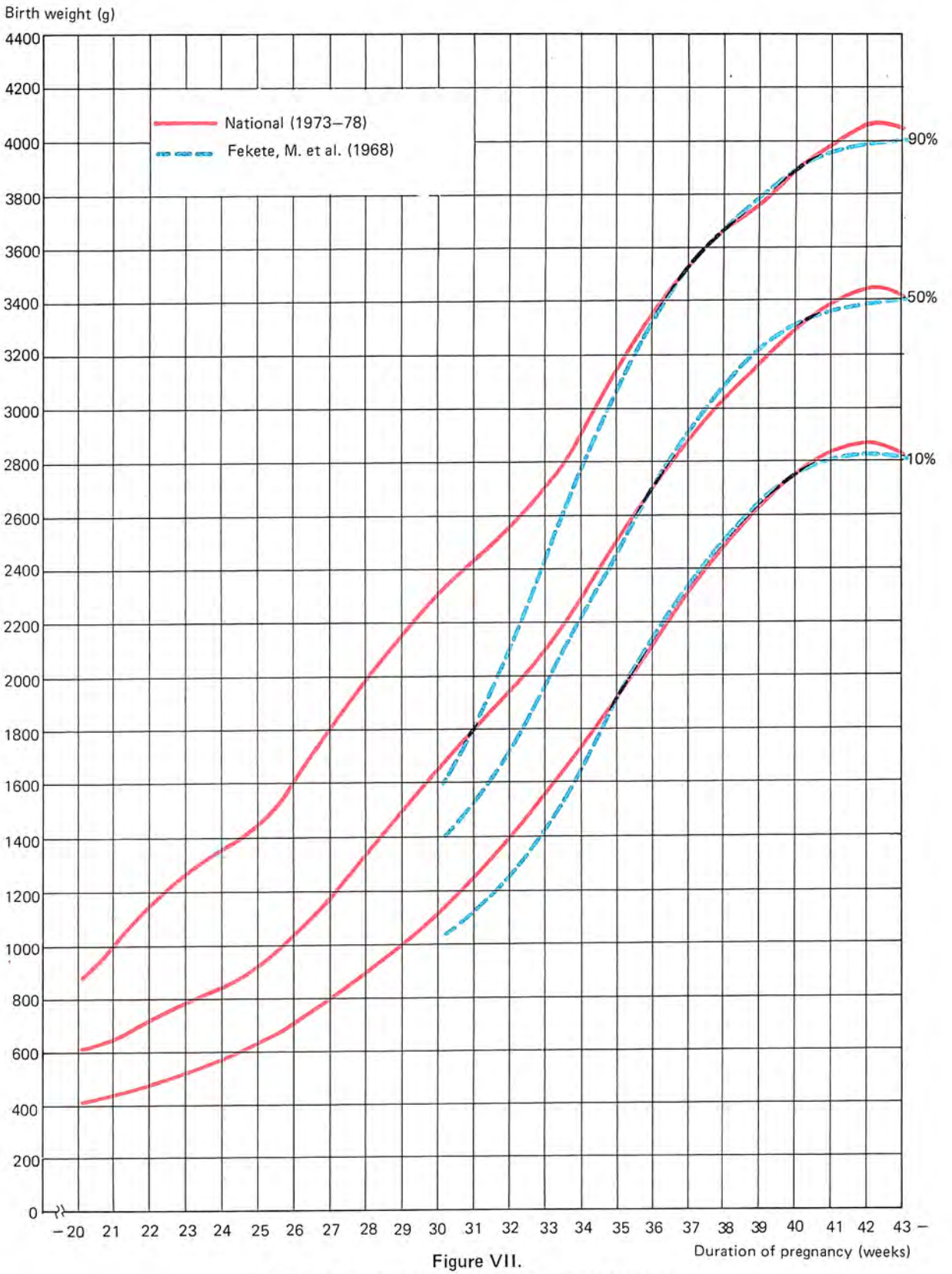


Figure VII.
Comparative illustration of birth weight standards
(Fekete, M. et al. (1968) and national (1973–78))

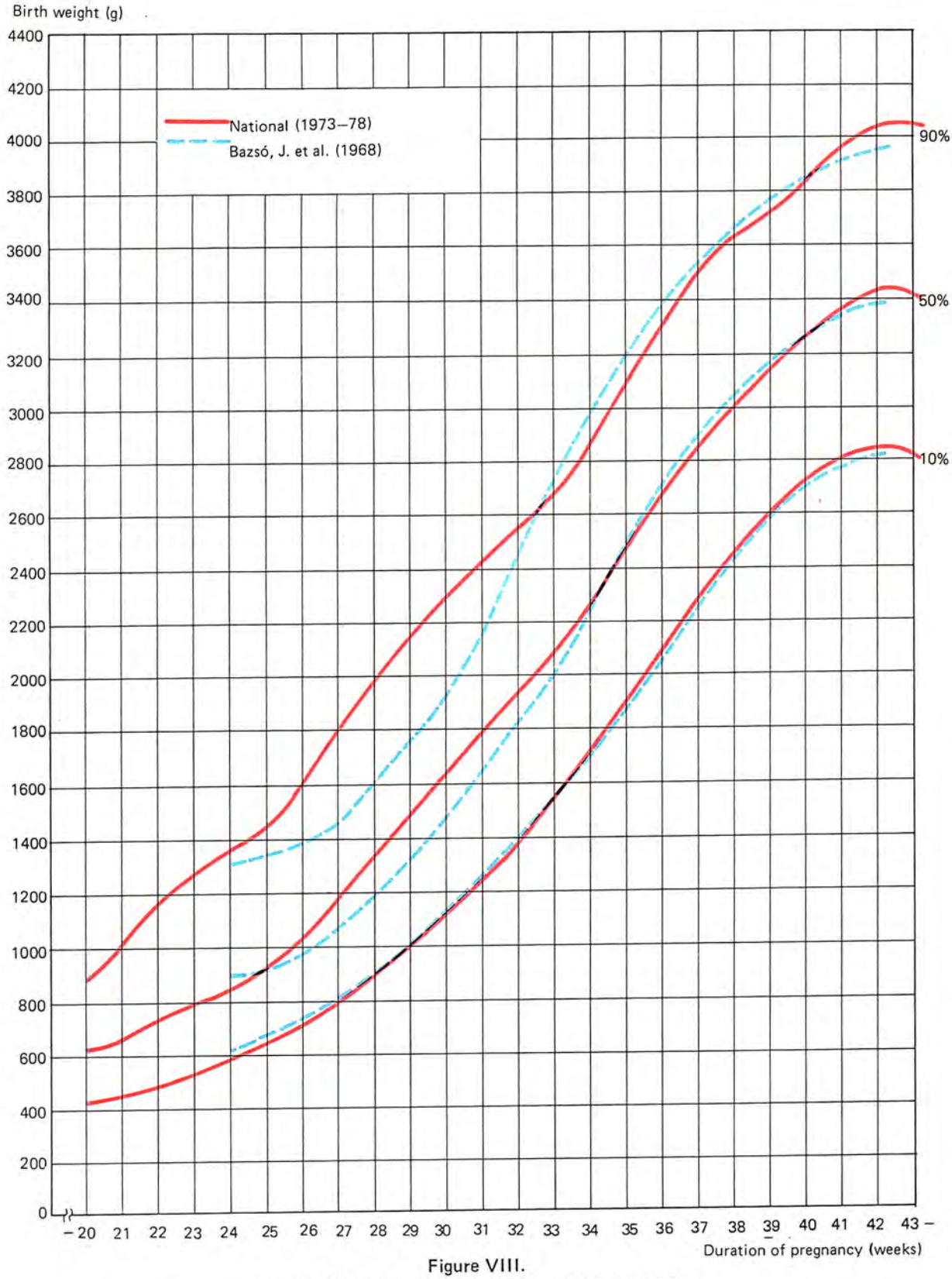


Figure VIII.
Comparative illustration of birth weight standards
(Bazsó, J. et al. (1968) and national (1973–78))

week of pregnancy and later/. On basis of the data of the table the following can be stated concerning the percental distribution of the newborn examined. 10.98 per cent of the total number of newborn covered by the survey are low-weight babies, consequently 89.02 per cent of them were born with a weight of 2 500 g or higher. As to the proportion of the newborn by duration of pregnancy: 14.37 per cent of them were born the 36th gestational week or earlier and 85.63 per cent of them the 37th week or later. The 7.28 per cent group of the babies born not only with a low weight but also pre-term is endangered most of all. Those belonging to this group could be considered as real premature infants. The share of low-weight babies who were born in term is 3.7 per cent. They are also much imperiled because the non-adequate development of weight - beside many other causes - can be often ascribed to the troubles of intra-uterine nutrition. This group may be called the group of low-weight infants born in term. The ratio of babies born pre-term with a normal weight is 7.09 per cent. In this group often just those newborn are endangered most of all who have a significant surplus weight as compared to their foetal age /maternal diabetes/. The overwhelming majority - 81.93 per cent - of the newborn included in the survey are over the critical limit - ascertained empirically, therefore it is not absolutely valid - both in respect of birth weight and in respect of gestational age.

Table 7. indicates the percental distribution of low-weight and non-low-weight newborn by categories of duration of pregnancy. 66.3 per cent of the low-weight infants were born pre-term /the 36th week or earlier/, 33.70 per cent of them in term /the 37th week or later/. Of the non-low-weight babies 7.96 per cent were born pre--term and 92.04 per cent in term.

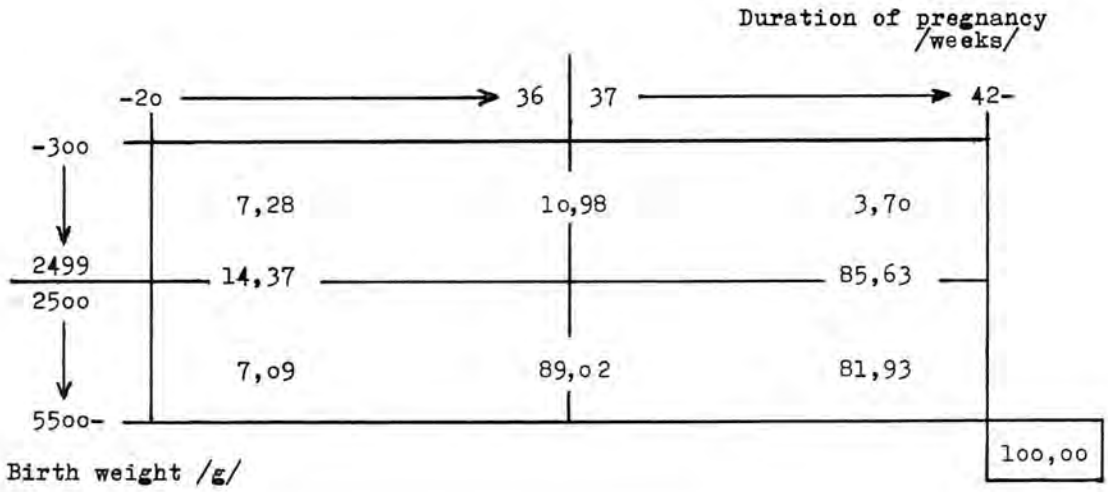
Table 8. presents the percental distribution of babies born the 36th week or earlier and the 37th week or later by birth weight. Among the pre-term infants the proportion of low-weight /50.67 per cent/ and of non-low-weight /49.33 per cent/ children is about the same. Of those born the 37th week of pregnancy and later the share of low-weight babies is only 4.32 per cent, while 95.68 per cent were born with a weight over 2 499 g.

Author considers as important to study the correlation between birth weight and duration of pregnancy, because for the judgement of the development of a newborn it is absolutely necessary to know the interrelation between these two factors. Naturally, for the judgement of the newborn's development it is also very important to state the physiological, neurological development, but this cannot be treated here at present.

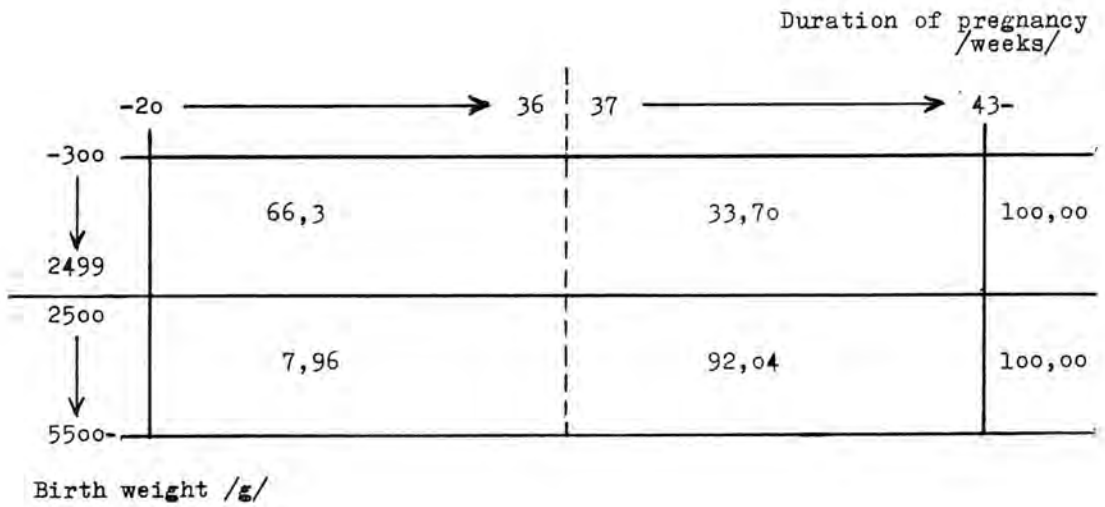
5. Development standards of length

Tables 9., 10. and 11. contain the numerical values of the percentiles of the birth length standard. Beside the percentile values the average of body length /$\bar{x}$/, the deviation /SD/ and the error of the mean value /$s_{\bar{x}}$/ are also indicated in these tables.

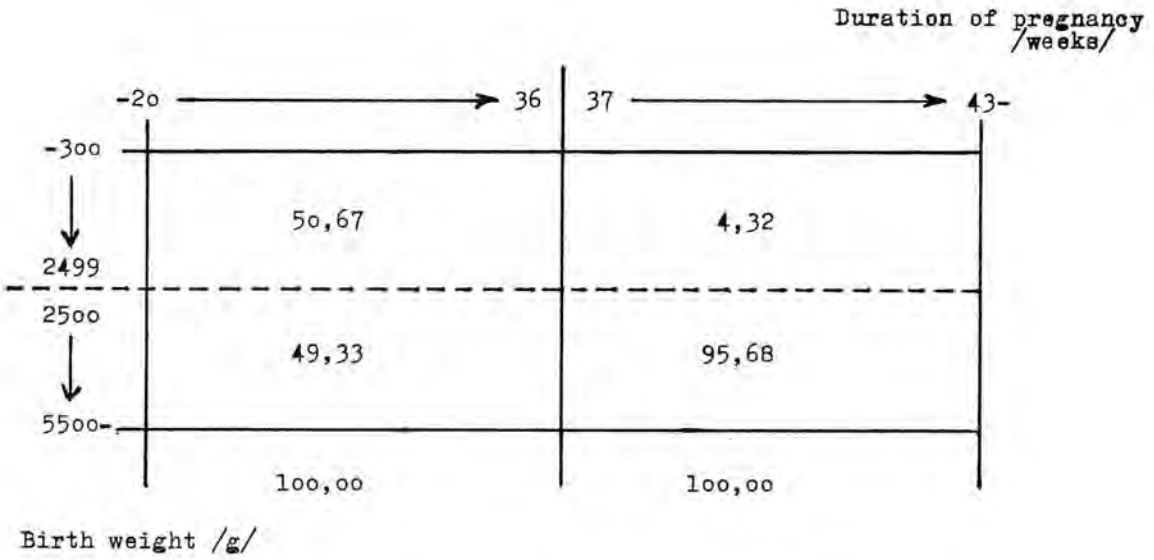
6. Percental distribution of the examined newborn by duration of pregnancy and birth weight on basis of the prematurity
/Females and males together/
/leányok és fiúk együtt/



7. Proportion of low-weight and non-low weight newborn by duration of pregnancy



8. Proportion of babies born pre-term and in term by birth weight limits



In Figures IX., X. and XI. the percentile curves of the birth length standard were drawn on basis of the numerical values of Tables 9., 10. and 11. Table 9. and Figure IX., respectively, contain the percentile values and percentile curves of female and male newborn; Table 11. and Figure XI. the numerical data and the curves regarding the development of length of male newborn.

Tables 9., 10. and 11. as well as Figures IX., X. and XI. help the obstetricians and neonatologists to ascertain development of the newborn's body length.

The development of the body length of female and male newborn is illustrated in Figure XII. by the comparison of the curves of the 10th, 50th and 90th percentiles. In the figure it can be stated that the three curve pairs are very close to one another till the 35th and 36th weeks of pregnancy, respectively, when the curves of the 50th, 90th and 10th percentiles deviate gradually from one another. At all the three percentiles the curve of the males rises over the curve indicating the

9. Adjusted birth length percentiles and birth length averages of female and male newborn

Duration of pregnancy /weeks/	Percentiles									$\bar{x}$	s (SD)	$s_{\bar{x}}$
	3	5	1o	25	5o	75	9o	95	97			
-2o	21,2	22,2	24,8	28,1	3o,9	34,2	37,3	38,7	4o,o	3o,5	4,76	o,27
21	22,4	23,3	25,8	28,8	31,6	35,o	38,2	39,8	41,3	31,7	4,86	o,31
22	24,1	25,2	27,4	3o,1	32,9	36,3	39,7	41,6	43,3	32,7	4,91	o,32
23	25,2	26,5	28,6	31,o	33,8	37,2	4o,7	43,o	44,8	33,9	4,86	o,17
24	26,1	27,5	29,5	32,o	34,8	38,1	41,7	44,2	46,o	34,5	4,96	o,16
25	26,9	28,5	3o,4	33,1	35,9	39,2	42,9	45,3	46,7	35,8	4,99	o,13
26	27,9	29,5	31,5	34,4	37,4	4o,8	44,3	46,5	47,6	36,7	5,o2	o,13
27	29,2	3o,8	32,9	35,9	39,1	42,5	45,8	47,6	48,6	38,8	5,o5	o,o8
28	3o,6	32,3	34,5	37,5	4o,8	44,1	47,2	48,7	49,6	4o,1	4,96	o,o8
29	31,8	33,7	36,o	39,o	42,4	45,6	48,3	49,6	5o,6	42,o	4,94	o,o7
3o	33,3	35,2	37,5	4o,4	43,7	46,6	49,1	5o,4	51,4	42,6	4,7o	o,o7
31	34,9	36,8	38,9	41,8	44,8	47,5	49,8	51,2	52,2	44,1	4,51	o,o5
32	36,6	38,3	4o,3	43,o	45,9	48,3	5o,4	51,8	52,7	45,o	4,18	o,o5
33	38,4	39,9	41,7	44,3	47,o	49,1	51,1	52,4	53,3	46,3	3,88	o,o4
34	4o,3	41,6	43,2	45,7	48,2	5o,3	52,2	53,5	54,3	47,o	3,63	o,o4
35	41,9	43,1	44,7	47,o	49,3	51,4	53,4	54,6	55,4	48,8	3,61	o,o2
36	43,5	44,5	46,o	48,1	5o,3	52,4	54,4	55,6	56,3	49,8	3,48	o,o2
37	45,o	45,9	47,2	49,1	51,2	53,4	55,3	56,5	57,2	5o,9	3,34	o,o1
38	46,2	47,o	48,1	49,8	51,9	54,o	55,9	57,o	57,7	51,2	3,o5	o,o1
39	47,o	47,7	48,8	5o,4	52,4	54,5	56,2	57,3	58,o	52,o	2,91	o,o1
4o	47,7	48,4	49,5	51,o	53,o	55,1	56,8	57,9	58,5	52,6	2,9o	o,o1
41	48,1	48,7	49,8	51,4	53,5	55,6	57,3	58,3	59,o	53,1	2,95	o,o1
42	48,3	49,o	5o,o	51,6	53,8	55,9	57,6	58,6	59,3	53,2	3,o2	o,o2
43-	48,2	48,9	5o,o	51,6	53,8	55,9	57,7	58,7	59,3	53,2	3,o8	o,o4

10. Birth length percentiles and birth length averages of female newborn

Duration of pregnancy /weeks/	Percentiles									$\bar{x}$	s (SD)	$s_{\bar{x}}$
	3	5	1o	25	5o	75	9o	95	97			
-2o	2o,9	22,o	25,1	28,o	3o,9	34,o	38,o	38,8	4o,1	3o,5	4,84	o,39
21	22,o	23,2	26,1	28,8	31,8	34,9	38,7	39,7	41,o	31,9	4,95	o,45
22	23,7	25,2	27,7	3o,1	33,1	36,3	39,8	41,2	42,5	32,8	4,88	o,47
23	24,9	26,7	28,8	31,1	33,9	37,1	4o,6	42,5	43,9	33,8	4,71	o,24
24	25,8	27,8	29,7	32,o	34,7	38,o	41,6	43,8	45,2	34,4	4,84	o,22
25	26,6	28,6	3o,5	33,o	35,7	39,1	42,7	45,1	46,4	35,7	5,o3	o,18
26	27,7	29,4	31,4	34,2	37,1	4o,6	44,2	46,5	47,6	36,5	5,11	o,19
27	29,o	3o,7	32,7	35,6	38,8	42,3	45,8	47,7	48,7	38,6	5,15	o,12
28	3o,5	32,2	34,3	37,2	4o,6	44,o	47,1	48,8	49,7	39,9	5,o5	o,12
29	31,8	33,6	35,9	38,8	42,3	45,6	48,3	49,8	5o,7	42,o	5,o1	o,1o
3o	33,2	35,1	37,4	4o,3	43,7	46,7	49,2	5o,6	51,5	42,7	4,78	o,11
31	35,o	37,o	38,9	41,7	44,9	47,6	49,9	51,2	52,2	44,2	4,48	o,o8
32	36,6	38,4	4o,2	43,o	46,o	48,4	5o,5	51,8	52,7	44,9	4.17	o,o7
33	38,5	39,9	41,6	44,2	46,9	49,1	51,1	52,4	53,2	46,2	3,84	o,o6
34	4o,3	41,6	43,2	45,5	48,o	5o,2	52,1	53,3	54,1	46,8	3,61	o,o5
35	41,9	43,o	44,6	46,8	49,1	51,3	53,2	54,3	55,2	48,6	3,54	o,o3
36	43,3	44,3	45,8	47,9	5o,1	52,2	54,1	55,2	56,o	49,6	3,41	o,o2
37	44,7	45,7	47,o	48,9	51,o	53,1	55,o	56,1	56,8	5o,6	3,27	o,o2
38	45,9	46,7	47,8	49,6	51,6	53,6	55,5	56,6	57,3	5o,9	3,oo	o,o1
39	46,8	47,5	48,5	5o,1	52,o	54,1	55,8	56,9	57,6	51,6	2,86	o,o1
4o	47,5	48,1	49,1	5o,7	52,6	54,7	56,4	57,5	58,1	52,2	2,87	o,o1
41	47,8	48,4	49,4	51,o	53,1	55,2	56,9	57,9	58,5	52,7	2,92	o,o1
42	48,o	48,6	49,7	51,2	53,4	55,5	57,3	58,3	58,9	52,8	3,oo	o,o2
43-	48,o	48,6	49,6	51,2	53,4	55,5	57,4	58,4	58,8	52,9	3,o5	o,o6

11. Birth length percentiles and birth length averages of male newborn

Duration of pregnancy /weeks/	Percentiles									$\bar{x}$	s (SD)	$s_{\bar{x}}$
	3	5	1o	25	5o	75	9o	95	97			
-2o	21,4	22,2	24,5	28,3	3o,9	34,3	37,o	38,5	38,9	3o,5	4,71	o,39
21	22,6	23,3	25,5	28,9	31,5	35,o	38,1	38,9	4o,5	31,6	4,82	o,43
22	24,4	25,2	27,2	3o,o	32,7	36,3	39,8	41,9	43,7	32,7	4,98	o,45
23	25,4	26,4	28,4	3o,9	33,8	37,2	4o,9	43,4	45,3	33,9	5,o1	o,25
24	26,3	27,4	29,4	31,9	34,9	38,1	41,9	44,6	46,4	34,6	5,o8	o,23
25	27,2	28,4	3o,6	33,2	36,2	39,4	43,o	45,4	46,9	35,9	4,95	o,18
26	28,1	29,5	31,8	34,6	37,6	41,o	44,3	46,3	47,5	36,9	4,93	o,18
27	29,5	3o,9	33,2	36,2	39,2	42,7	45,8	47,5	48,4	39,o	4,95	o,12
28	3o,8	32,5	34,8	37,8	4o,8	44,3	47,1	48,6	49,4	4o,3	4,87	o,12
29	31,9	33,8	36,2	39,2	42,3	45,6	48,1	49,6	5o,5	42,o	4,87	o,o9
3o	33,3	35,2	37,5	4o,5	43,6	46,5	48,9	5o,3	51,4	42,6	4,62	o,1o
31	34,9	36,7	38,9	41,9	44,8	47,4	49,7	51,1	52,2	44,1	4,54	o,o8
32	36,6	38,3	4o,2	43,1	45,9	48,3	5o,4	51,8	52,8	45,o	4,19	o,o7
33	38,4	4o,o	41,7	44,4	47,o	49,2	51,2	52,5	53,5	46,3	3,92	o,o6
34	4o,3	41,7	43,3	45,9	48,2	5o,4	52,4	53,7	54,5	47,1	3,65	o,o5
35	42,o	43,3	44,8	47,2	49,5	51,7	53,7	54,8	55,6	49,o	3,65	o,o3
36	43,6	44,7	46,2	48,3	5o,5	52,7	54,7	55,8	56,6	5o,1	3,52	o,o3
37	45,1	46,1	47,4	49,4	51,5	53,7	55,6	56,8	57,5	51,2	3,37	o,o2
38	46,4	47,2	48,4	5o,1	52,2	54,3	56,2	57,3	58,o	51,5	3,o6	o,o1
39	47,3	48,o	49,1	5o,7	52,7	54,8	56,6	57,6	58,3	52,3	2,92	o,o1
4o	48,o	48,7	49,8	51,3	53,3	55,4	57,2	58,2	58,9	53,o	2,9o	o,o1
41	48,4	49,1	5o,1	51,7	53,8	55,9	57,7	58,7	59,3	53,4	2,94	o,o1
42	48,7	49,4	5o,3	52,o	54,4	56,3	58,o	59,o	59,7	53,6	3,o1	o,o2
43-	48,3	49,1	5o,2	52,o	54,1	56,2	57,9	58,9	59,7	53,5	3,o8	o,o6

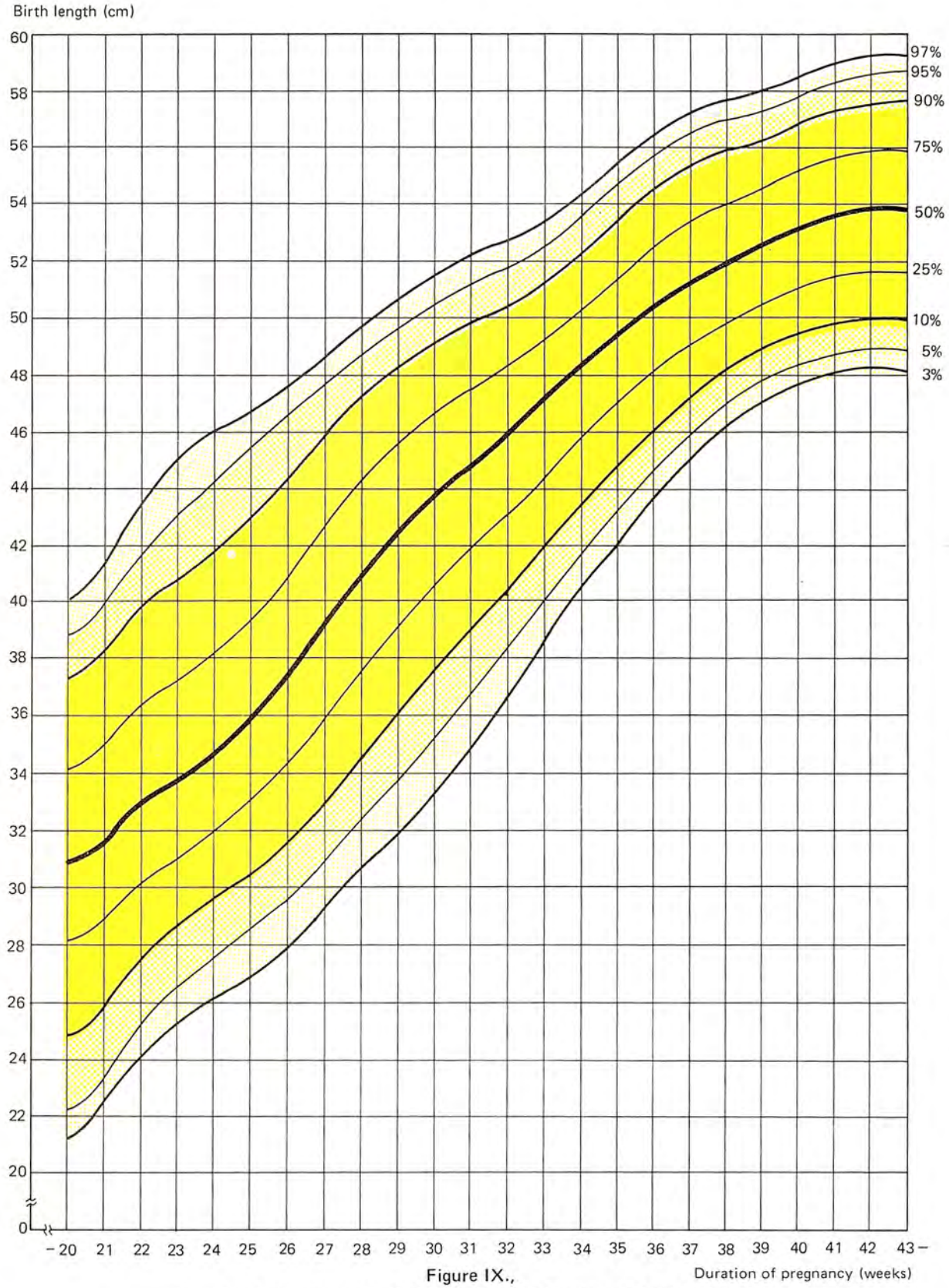


Figure IX.,
Joint development standard of body lenght of female and male newborn
(Birth length percentiles)

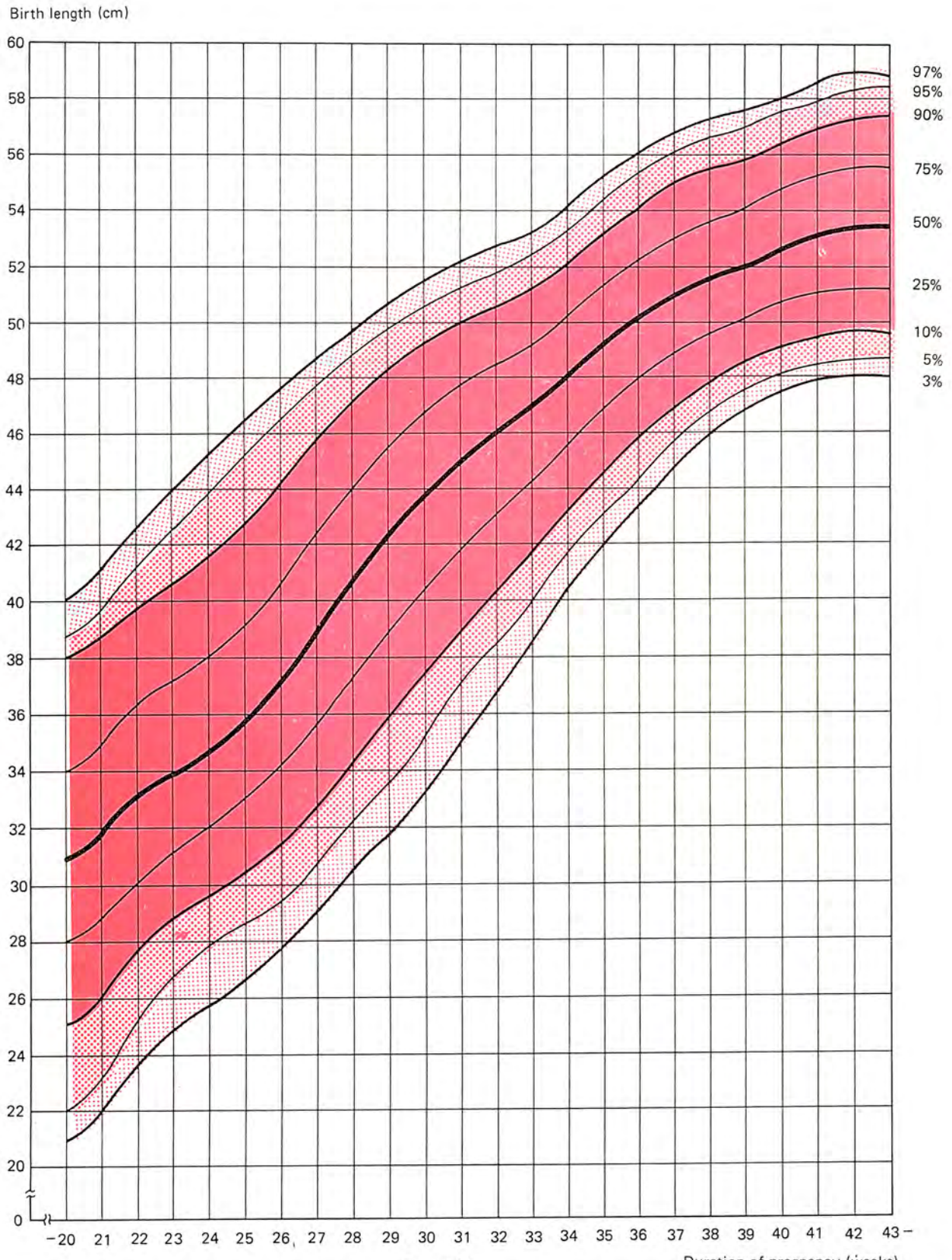


Figure X.
Development standard of body length of female newborn
(Birth length percentiles)

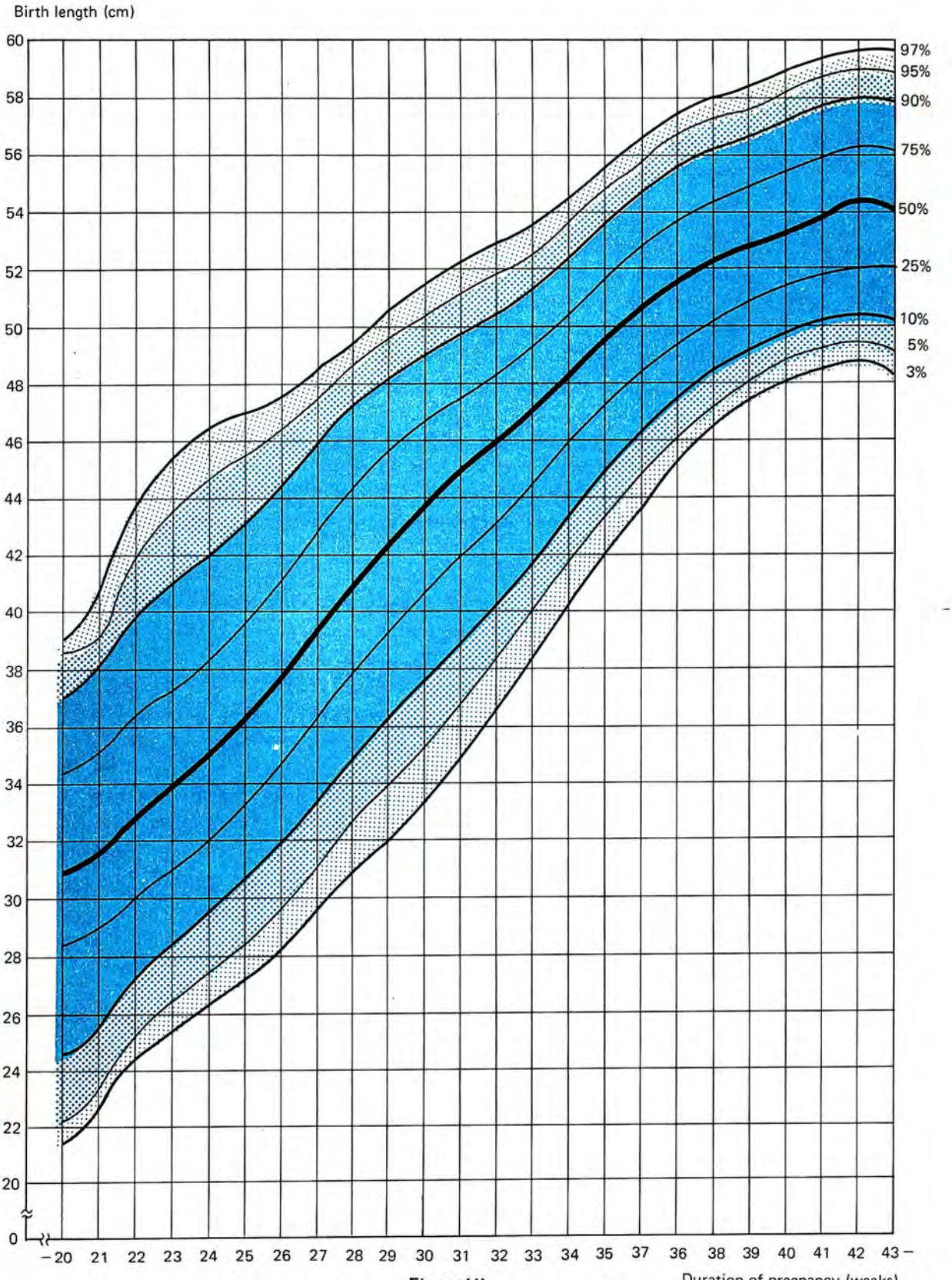


Figure XI.
Development standard of body length of male newborn
(Birth length percentiles)

body lengt of females, but the difference in the body length reaches 1 cm at the curve of the 50th percentile only one week of pregnancy, the 42nd one.

Author compared the development standard of birth length elaborated by himself to the development standards of birth length of Lubchenco, L.O., Hansman, Ch., Boyd, E. /1966/ and Fekete, M., Igazi, K., Járai, I., Lajos, L., Mestyán, Gy., Waszner, Zs. /1968/.

Figure XIII. illustrates the curves of the 10th, 50th and 90th percentiles of Lubchenco's development standard of body length as well as the similar curves of the national birth length standard. The corresponding percentile curves of the two standards were very far from one another, the smallest difference - 1 cm - in the values of the 10th percentile was at the 27th and 30th weeks, the greatest distance is nearly 5 cm; the 29th week the 90th percentile of the national standard is higher by this value than the 90th percentile of Lubchenco's standard. The very great differences between the two development standards of body length - similarly as in case of the development standard of birth weight - are caused first of all by the divergent hereditary characteristics. Also the use of different measuring technics, of other measuring instruments may produce differences but they only represent a small part of the total difference.

Figure XIV. compares the percentiles of Fekete's development standard of body length to the corresponding percentiles of the national standard. Till the 34th gestational week the 90th and 50th percentiles of Fekete's standard are under, and the 10th percentile almost overlaps the corresponding percentils of the national standard. After the 34th and 35th gestational weeks, respectively, each percentile of Fekete's standard gets over the comparative curves and reaches the maximum difference of 1.2 cm in body length in case of babies born the 38th - 39th weeks. In the section after the 35th week Fekete's development standard of body length has higher values because the sample is selected significantly. And the standard values under the 35th week are lower than the author's corresponding standard values because here the number of cases per individual gestational week is already very low /See Table 1./.

When writing this paper the author's purpose was to provide a reliable method to obstetricians and neonatologists to ascertain quickly the development of the newborn. This purpose was accomplished by the elaboration of the development standard of birth weight and birth length. The data of 1 059 922 liveborns were used in the study, which is a garantee that the values are reliable enough to serve as standards. The suitability of the author's standards for this purpose is also confirmed by the comparison with the standards of other authors.

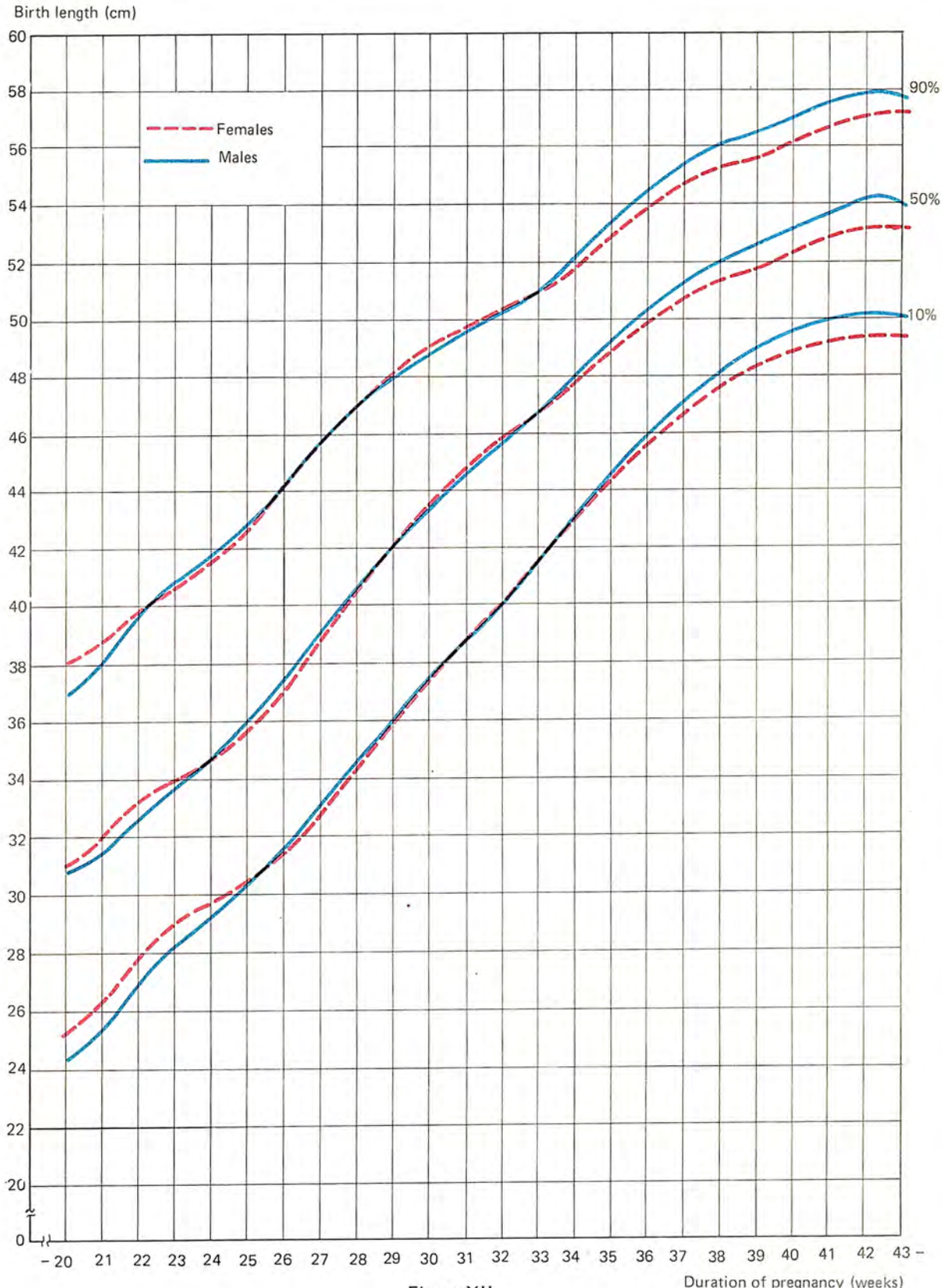


Figure XII.
Comparative illustration of the body length percentiles
of female and male newborn

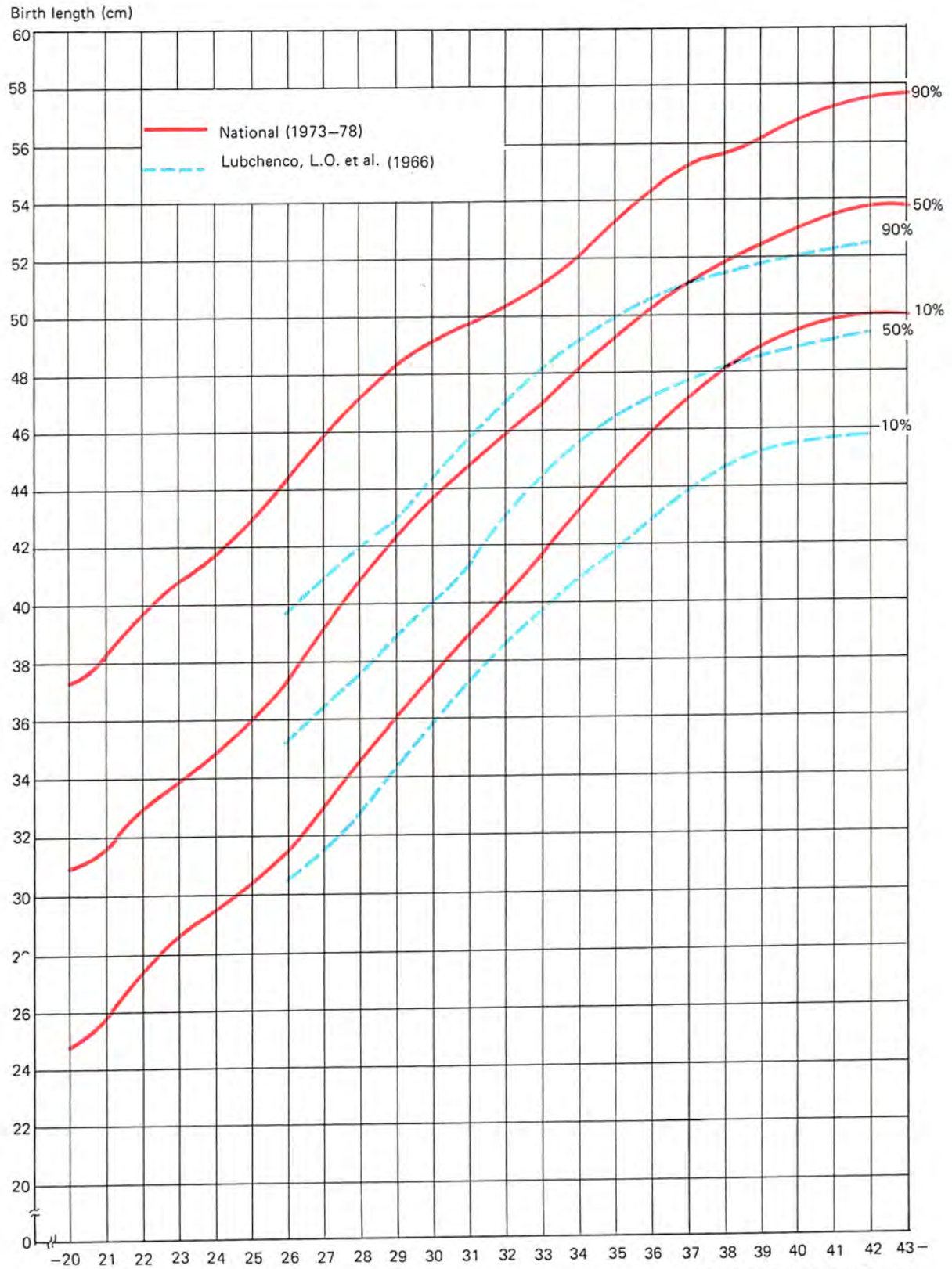


Figure XIII.
Comparative illustration of birth length percentiles
(Lubchenco, L.O. et al. (1966) and national (1973–78))

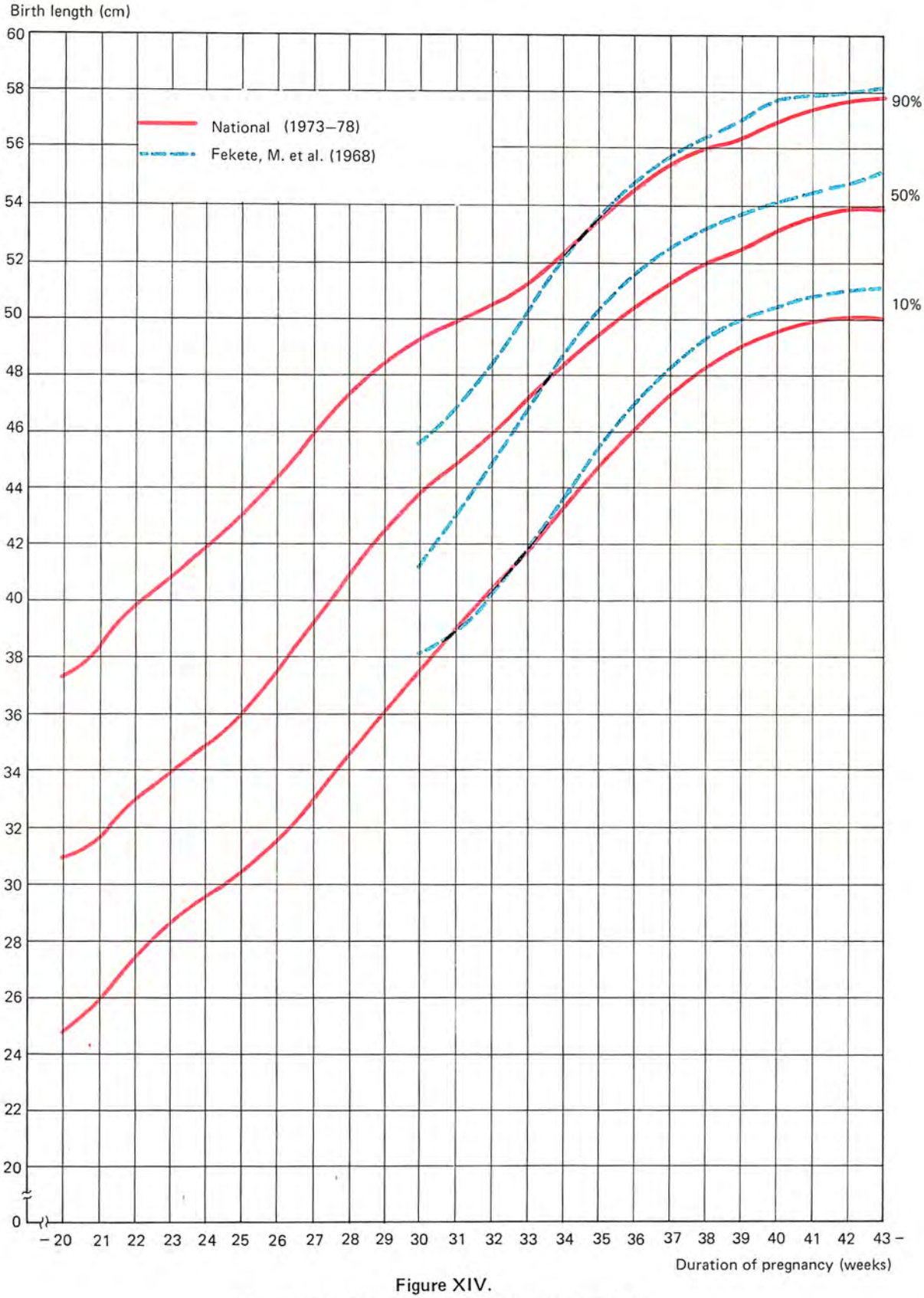


Figure XIV.
Comparative illustration of birth length standards
(Fekete, M. et al. (1968) and national (1973–78))

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