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FOOD AND AGRICULTURE
ORGANIZATION
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Agenda Item 5 (d)

CX/PR 01/6

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON PESTICIDE RESIDUES

Thirty-third Session

The Hague, The Netherlands, 2-7 April 2001

REPORT ON THE REVISION OF REGIONAL DIETS AND INFORMATION ON PROCESSING¹

Revision of GEMS/Food Regional Diets

1. At the Thirty-first session of the Committee, WHO presented its efforts to expanded the five GEMS/Food Regional Diets² to produce more representative diets using a cluster analysis approach³. At its last session, the Committee considered government responses to Circular Letter CL1999/30-PR, which were largely supportive of the 13 Cluster Consumption Diets. However, several technical questions were raised. In particular, the Committee requested GEMS/Food to develop some examples of the impact the new Consumption Cluster Diets may have on exposure assessment if they were adopted. In addition, the Committee requested GEMS/Food to provide an estimate of the total consumption of food in order to assess potential differences among the clusters.⁴

2. In responding to the first request of the Committee, GEMS/Food used the Theoretical Maximum Daily Intake (TMDI) for a hypothetical pesticide to compare the current 5 GEMS/Food Regional Diets (Table 1) with the proposed 13 GEMS/Food Consumption Cluster Diets (Table 2). While similar relative results would have been obtained if the International Estimated Daily Intake (IEDI), it should be noted that IEDI is usually 3 to 5 times lower than the corresponding TMDI for pesticides that have been considered by JMPR.

3. For the current 5 GEMS/Food Regional Diets, the TMDI ranged from 21% for the Latin American Diet to 42% for the Far Eastern Diet with an average of 29%. For the same commodities and MRLs, the Consumption Cluster Diets ranged from 18% for Cluster K (Northeast Latin

¹ Paper prepared by Dr G. Moy, Food Safety Programme, Department for Protection of the Human Environment, World Health Organization, Geneva, Switzerland

² GEMS/Food Regional Diets. Regional per captical consumption of raw and semi-processed agricultural commodities, GEMS/Food Programme, WHO/FSF/FOS/98.3, WHO, Geneva (1998)

³ Progress report by WHO on the revision of GEMS/Food Regional Diets, CX/PR 99/3, February 1999

⁴ ALINORM 01/24, para 38

America) to 54% for Cluster C (Northern African) with an average of 35%. While the differences between the two diets were not great, the Consumption Cluster Diets more accurately reflect the consumption of staples and other major components in the diets of the represented populations. The slight change in the average between the two is likely due to the fact that the most recent FAO Food Balance Sheet data was used to calculate the Consumption Cluster Diets.

4. Regarding the GEMS/Food European-type Diet, the TMDI was calculated to be 24%. In the new Cluster Consumption Diets, the European-type Diet is represented by 5 different diets (B, D, E, F and M). The TMDIs for these diets ranged from 27% for Consumption Cluster E (Western European) to 39% for Consumption Cluster D, which is largely composed of countries that comprised the former USSR. However, it should be noted that countries in Cluster D were not represented in the current GEMS/Food Regional Diets because FAO Food Balance Sheet data for these countries were not previously available.

5. Overall, the average exposure assessment of the Consumption Cluster Diets is about 20% greater than the average of the current 5 GEMS/Food Diets. This is likely due to increases in food production and better representation by countries. In the case of the GEMS/Food European-type Diet, an increase in the estimate of exposure of about 60% might be expected compared to highest Consumption Cluster Diet that would replace it. Predictably, variations among diets are greater with the Consumption Cluster Diets because consumption of staples and other major food items are not averaged among countries with quite different dietary patterns. However, the proposed Consumption Cluster Diets are more representative of the dietary patterns of countries.

6. Regarding the request to provide estimates of total food consumption for the Consumption Cluster Diets in order to assess potential differences among countries, these calculations are provided in Table 2. The lowest consumption was 1156 g/person/day for mainly least developed countries and probably reflects the high degree of subsistence agriculture, which is not included in the FAO Food Balance Sheets. The highest value was 2337 g/person/day for countries on or near the Mediterranean, which had much higher consumption of both fruits and vegetables than any other cluster. In general, the total food consumption is slightly greater than the current GEMS/Food Regional Diets.

Information on Processing

6. At its last session, the Committee considered the responses to the circular letter⁵ requesting information on processing. Only Thailand fully completed the questionnaire on food processing practices. Given the short time to reply to the circular letter, the Committee decided to issue a follow up circular letter⁶. The Committee also agreed to forward the questionnaire to JMPR to obtain their comment on the use of the resulting food processing information.

7. In response to the circular letter, no new submissions of processing information has been received from Member countries. Consequently, it is not feasible at this time to develop comprehensive guidance on the predominant types of processing methods used in Member countries.

8. The 2000 JMPR reviewed the GEMS/Food processing questionnaire. Aware that the five GEMS/Food regional diets currently consist mainly of raw agricultural commodities, and that the predominant processing practice used nationally or regionally is not always identified, the Meeting therefore welcomed use of the questionnaire to fill in gaps in knowledge about the typical methods of processing of raw agricultural commodities in these diets for use in dietary risk assessment. The

⁵ CL 1999/30-PR Part 3C.

⁶ CL 2000/27-PR Part 4C.

Meeting noted that data on consumption are not available for important processed foods such as juices of apples, sour cherries, citrus fruit, black currants, grapes, and pineapple or for barley beer, maize meal, and bran of rye and wheat. In these cases, even when processing data are available, long-term dietary intake cannot be determined.

9. The Meeting recognized that important processed commodities are processed in almost identical ways world wide, and, consequently, processing data generated according to national requirements are applicable for international assessments. Any significant differences in processing techniques from one region to another would be revealed in responses to the questionnaire. The JMPR will continue to evaluate processing data as described in the *FAO Manual*. No default factors will be applied and no new requirements will be imposed upon data submitters. The Meeting recognized that the questionnaire serves as a basis for defining appropriate processed commodities and recommended that GEMS/Food uses the information from the questionnaire to revise or develop data on food consumption for assessing short-term and long-term dietary intake.

10. GEMS/Food is reconsidering the questionnaire to focus more specifically on processed commodities of interest to the JMPR. This will take into account information available from Member countries based on their specific national and regional requirements for data on the fate of pesticide residues during processing.

Hypothetical TMDIs using the Five GEMS/Food Regional Diets

Table 1

THEORETICAL MAXIMUM DAILY INTAKE (TMDI)												
	PESTICIDE Code -											
	Name -	XXX										
	ADI =	0.1	mg/kg bodyweight or		6.000		mg/person					
Commodity			Middle Eastern		Far Eastern		African		Latin American		European	
			Diet	TMDI	Diet	TMDI	Diet	TMDI	Diet	TMDI	Diet	TMDI
			g/day	mg/day	g/day	mg/day	g/day	mg/day	g/day	mg/day	g/day	mg/day
Code	Name	MRL mg/kg										
GC 640	Barley	20	1.0	0.0200	3.5	0.0700	1.8	0.0350	6.5	0.1300	19.8	0.3950
VD 71	Beans (dry)	2	6.8	0.0136	6.8	0.0136	0.0	0.0000	13.5	0.0270	4.3	0.0086
MM 812	Cattle meat	0.1	18.5	0.0019	3.5	0.0004	10.4	0.0010	30.0	0.0030	63.3	0.0063
ML 812	Cattle milk	0.1	79.5	0.0080	23.2	0.0023	35.8	0.0036	159.3	0.0159	287.0	0.0287
PE 112	Eggs	0.1	14.6	0.0015	13.1	0.0013	3.7	0.0004	11.9	0.0012	37.6	0.0038
GC 645	Maize	1	48.3	0.0483	31.2	0.0312	106.2	0.1062	41.8	0.0418	8.8	0.0088
GC 647	Oats	20	0.0	0.0000	0.0	0.0000	0.2	0.0033	0.8	0.0150	2.0	0.0400
VD 72	Peas (dry)	5	0.5	0.0025	1.7	0.0083	0.0	0.0000	1.3	0.0063	1.8	0.0088
MM 818	Pig meat	0.1	0.0	0.0000	27.2	0.0027	2.6	0.0003	10.5	0.0011	75.8	0.0076
PM 110	Poultry meat	0.1	31.0	0.0031	13.2	0.0013	5.5	0.0006	25.3	0.0025	53.0	0.0053
GC 649	Rice	5	48.8	0.2440	279.3	1.3965	103.4	0.5170	86.5	0.4325	11.8	0.0590
GC 651	Sorghum	20	2.0	0.0400	9.7	0.1933	26.6	0.5317	0.0	0.0000	0.0	0.0000
GC 654	Wheat	5	327.3	1.6365	114.8	0.5740	28.3	0.1415	116.8	0.5840	178.0	0.8900
			TOTAL =	2.019		2.295		1.34		1.26		1.462
			% ADI =	34%		42%		22%		21%		24%

Table 2

Hypothetical TMDIs using the Thirteen GEMS/Food Consumption Cluster Diets

THEORETICAL MAXIMUM DAILY INTAKE (TMDI)												
	PESTICIDE Code -											
	Name -	XXX										
	ADI =	0.1	mg/kg bodyweight or	6.000	mg/person							
Commodity			Cluster A		Cluster B		Cluster C		Cluster D		Cluster E	
			Diet	TMDI	Diet	TMDI	Diet	TMDI	Diet	TMDI	Diet	TMDI
			g/day	mg/day	g/day	mg/day	g/day	mg/day	g/day	mg/day	g/day	mg/day
Code	Name	MRL mg/kg										
GC 640	Barley	20	4.4	0.0880	1.2	0.0240	35.9	0.7180	3.3	0.0660	4.3	0.0860
VD 71	Beans (dry)	2	14.4	0.0288	6.4	0.0128	1.2	0.0024	2.8	0.0056	2.8	0.0056
MM 812	Cattle meat	0.1	16.2	0.0016	40.5	0.0041	14.1	0.0014	39.3	0.0039	52.8	0.0053
ML 812	Cattle milk	0.1	66.5	0.0067	266.9	0.0267	158.1	0.0158	318.9	0.0319	354.2	0.0354
PE 112	Eggs	0.1	4.2	0.0004	33.4	0.0033	15.6	0.0016	19.0	0.0019	31.7	0.0032
GC 645	Maize	1	45.1	0.0451	10.5	0.0105	23.4	0.0234	32.7	0.0327	19.2	0.0192
GC 647	Oats	20	0.5	0.0100	0.6	0.0120	0.1	0.0028	2.8	0.0560	3.4	0.0680
VD 72	Peas (dry)	5	2.2	0.0110	1.0	0.0050	1.1	0.0055	4.5	0.0225	3.9	0.0195
MM 818	Pig meat	0.1	10.6	0.0011	58.3	0.0058	0.1	0.0000	33.7	0.0034	122.7	0.0123
PM 110	Poultry meat	0.1	11.1	0.0011	62.0	0.0062	37.8	0.0038	16.6	0.0017	41.5	0.0042
GC 649	Rice	5	116.1	0.5805	43.6	0.2180	57.3	0.2865	19.3	0.0965	10.1	0.0505
GC 651	Sorghum	20	19.7	0.3940	0.1	0.0020	3.8	0.0760	0.1	0.0020	0.1	0.0020
GC 654	Wheat	5	77.7	0.3885	334.6	1.6730	424.0	2.1200	405.2	2.0260	258.9	1.2945
			TOTAL =	1.557		2.003		3.257		2.35		1.606
			% ADI =	26%		36%		54%		39%		27%

THEORETICAL MAXIMUM DAILY INTAKE (TMDI)												
	PESTICIDE Code -											
	Name -	XXX										
	ADI =	0.1	mg/kg body weight or	6.000	mg/person							
Commodity			Cluster F		Cluster G		Cluster H		Cluster I		Cluster J	
			Diet	TMDI	Diet	TMDI	Diet	TMDI	Diet	TMDI	Diet	TMDI
			g/day	mg/day	g/day	mg/day	g/day	mg/day	g/day	mg/day	g/day	mg/day
Code	Name	MRL mg/kg										
GC 640	Barley	20	20.7	0.4140	3.0	0.0600	0.8	0.0160	0.2	0.0040	0.4	0.0080
VD 71	Beans (dry)	2	0.8	0.0016	3.7	0.0074	17.3	0.0346	7.2	0.0144	1.2	0.0024
MM 812	Cattle meat	0.1	55.9	0.0056	13.5	0.0014	35.6	0.0036	20.7	0.0021	16.0	0.0016
ML 812	Cattle milk	0.1	351.0	0.0351	61.5	0.0062	128.0	0.0128	85.2	0.0085	103.8	0.0104
PE 112	Eggs	0.1	29.5	0.0030	7.6	0.0008	15.9	0.0016	5.2	0.0005	3.6	0.0004
GC 645	Maize	1	1.2	0.0012	29.3	0.0293	133.7	0.1337	215.2	0.2152	36.8	0.0368
GC 647	Oats	20	7.7	0.1540	0.1	0.0020	0.9	0.0180	1.1	0.0220	0.1	0.0020
VD 72	Peas (dry)	5	1.7	0.0085	0.7	0.0035	0.6	0.0030	0.9	0.0045	0.5	0.0025
MM 818	Pig meat	0.1	67.0	0.0067	12.0	0.0012	21.1	0.0021	9.8	0.0010	2.0	0.0002
PM 110	Poultry meat	0.1	16.9	0.0017	6.9	0.0007	43.6	0.0044	13.9	0.0014	7.1	0.0007
GC 649	Rice	5	7.6	0.0380	347.5	1.7375	77.7	0.3885	41.8	0.2090	87.6	0.4380
GC 651	Sorghum	20	0.1	0.0020	2.8	0.0560	7.2	0.1440	21.8	0.4360	118.0	2.3600
GC 654	Wheat	5	234.1	1.1705	122.6	0.6130	114.2	0.5710	75.1	0.3755	62.6	0.3130
			TOTAL=	1.8418		2.5188		1.3332		1.2940		3.1759
			% ADI =	31%		46%		22%		22%		53%

THEORETICAL MAXIMUM DAILY INTAKE (TMDI)								
	PESTICIDE Code -							
	Name -	XXX						
	ADI =	0.1	mg/kg bodyweight or	6.000	mg/person			
Commodity			Cluster K		Cluster L		Cluster M	
			Diet	TMDI	Diet	TMDI	Diet	TMDI
			g/day	mg/day	g/day	mg/day	g/day	mg/day
Code	Name	MRL mg/kg						
GC 640	Barley	20	2.3	0.0460	2.1	0.0420	3.4	0.0680
VD 71	Beans (dry)	2	8.3	0.0166	5.1	0.0102	3.4	0.0068
MM 812	Cattle meat	0.1	41.2	0.0041	27.3	0.0027	119.3	0.0119
ML 812	Cattle milk	0.1	232.6	0.0233	103.0	0.0103	356.8	0.0357
PE 112	Eggs	0.1	15.6	0.0016	19.9	0.0020	24.9	0.0025
GC 645	Maize	1	30.5	0.0305	30.0	0.0300	23.0	0.0230
GC 647	Oats	20	1.4	0.0280	0.4	0.0080	7.1	0.1420
VD 72	Peas (dry)	5	3.2	0.0160	0.6	0.0030	3.5	0.0175
MM 818	Pig meat	0.1	29.0	0.0029	39.3	0.0039	46.0	0.0046
PM 110	Poultry meat	0.1	72.3	0.0072	52.9	0.0053	63.6	0.0064
GC 649	Rice	5	7.6	0.0380	347.5	1.7375	77.7	0.3885
GC 651	Sorghum	20	0.1	0.0020	0.4	0.0080	0.1	0.0020
GC 654	Wheat	5	168.0	0.8400	114.0	0.5700	250.4	1.2520
			TOTAL =	1.0562		2.4329		1.9609
			% ADI =	18%		44%		33%

Table 3

Country Assignments to the 13 Proposed GEMS/Food Consumption Cluster Diet

FINAL CLUSTER	COUNTRY	FINAL CLUSTER	COUNTRY	FINAL CLUSTER	COUNTRY
A	Angola	D	Georgia	G	Sri Lanka
A	Burundi	D	Iran, Islamic Rep of	G	Thailand
A	Cameroon	D	Kazakhstan	G	Viet Nam
A	Central African Republic	D	Kyrgyzstan		
A	Comoros	D	Moldova, Republic of	H	Bolivia
A	Congo, Democratic Republic of	D	Romania	H	El Salvador
A	Côte d'Ivoire	D	Russian Federation	H	Fiji
A	Djibouti	D	Tajikistan	H	Guatemala
A	Eritrea	D	The former Yugoslav Republic of Macedonia	H	Haiti
A	Ethiopia	D	Turkmenistan	H	Honduras
A	Gabon	D	Ukraine	H	Mexico
A	Guinea	D	Uzbekistan	H	Nicaragua
A	Guinea Bissau	E	Austria	H	Panama
A	Liberia	E	Belgium	H	Paraguay
A	Madagascar	E	Croatia	H	Peru
A	Mauritius	E	Czech Republic	H	Saint Kitts & Nevis
A	Rwanda	E	Denmark	H	St. Vincent & Grenadine
A	Sao Tome & Principe	E	France	I	Botswana
A	Seychelles	E	Germany	I	Cape Verde
A	Sierra Leone	E	Hungary	I	Ghana
A	Somalia	E	Ireland	I	Kenya
A	Uganda	E	Malta	I	Lesotho
A	Yemen	E	Netherlands	I	Malawi
		E	Poland	I	Mozambique
B	Cyprus	E	Slovakia	I	Namibia
B	Greece	E	Slovenia	I	Reunion
B	Israel	E	Switzerland	I	South Africa
B	Italy	E	United Kingdom	I	Swaziland
B	Lebanon	E	Yugoslavia	I	Togo
B	Portugal			I	United Republic of Tanzania
B	Spain	F	Estonia	I	Zambia
B	Turkey	F	Finland	I	Zimbabwe
B	United Arab Emirates	F	Iceland	J	Burkina Faso
		F	Latvia	J	Chad
C	Algeria	F	Lithuania	J	Congo, Republic of
C	Egypt	F	Norway	J	Gambia
C	Iraq	F	Sweden	J	Mali
C	Jordan			J	Mauritania
C	Kuwait	G	Afghanistan	J	Niger
C	Libya Arab Jamahiriya	G	Bangladesh	J	Nigeria
C	Morocco	G	Cambodia	J	Senegal
C	Saudi Arabia	G	China	J	Sudan
C	Syrian Arab Republic	G	India		
C	Tunisia	G	Indonesia		
		G	Laos		
D	Albania	L	Malaysia	K	Antigua & Barbuda
D	Armenia	G	Mongolia	K	Aruba (Neth.)
D	Azerbaijan	G	Myanmar	K	Bahamas
D	Belarus	G	Nepal	K	Barbados
D	Bosnia and Herzegovina	G	Pakistan	K	Belize
D	Bulgaria				

K Bermuda
K Brazil
K Colombia
K Costa Rica
K Cuba
K Dominica
K Dominican Republic
K Ecuador
K French Guyana
K Grenada
K Guadeloupe
K Guyana
K Jamaica
K Martinique
K Saint Lucia
K Suriname
K Trinidad and Tobago
K Venezuela
L Brunei Darussalam
L French Polynesia
L Japan
L Kiribati
L Democratic People's
Republic of Korea
L Republic of Korea
L Madagascar
L Maldives
L New Caledonia
L Papua New Guinea
L Philippines
L Solomon Islands
L Vanuatu

M Argentina
M Australia
M Canada
M Chile
M New Zealand
M United States
M Uruguay

**Table 4: Total Food Consumption for the proposed GEMS/Food Consumption Cluster Diets
(g/person/day)**

FOOD GROUPS	FINAL	FINAL	FINAL	FINAL	FINAL	FINAL	FINAL	FINAL	FINAL	FINAL	FINAL	FINAL	FINAL
	A	B	C	D	E	F	G	H	I	J	K	L	M
Cereals	255.3	448.1	602.8	482.5	295	324.5	492.2	410.6	359.8	409.7	292.8	379.3	310.3
Pulses	31	23.7	17.9	9.6	7.5	3.2	16.3	31.9	17.6	24.1	36.3	8.9	10.4
Tubers and roots	392.1	187.2	65.1	250.4	244.3	230.6	111.8	93.4	356.1	344.4	172.1	110	165.8
Vegetables	59.6	451.2	270.5	223.6	261.2	172.7	209.8	92	77.5	89.3	85.8	276.7	277.4
Fruits	183.5	403.1	246.8	154.9	263.2	228.3	98.9	258.2	101.5	106.9	276.9	192.4	310.2
Milk and eggs	48.2	305.9	125.3	344.4	378.6	503.1	87.2	201.5	97.2	110.2	269.8	136.6	411.7
Meat and meat products, incl. poultry and fish	59.3	239.3	70.8	147.3	272.4	247.9	76.8	134.4	71.6	55.9	151.9	246.8	356.1
Miscellaneous	35.9	102.1	93.2	81.3	127.8	127.8	52.7	123.1	56.6	45.5	139.2	90.4	117.2
Alcohol, incl. beer and wine	90.9	176.1	6.8	70.5	339.1	184.4	24	102.4	109.2	109.5	100.8	138.7	272.4
Total Diet (g/day)	1156	2337	1499	1765	2189	2023	1170	1448	1247	1296	1526	1580	2232