

EOSBET Dice fairness report

First transaction:	2018-08-19 00:44:13
Last transaction:	2018-10-03 23:59:59
Total resolvebet transactions:	5273725
Total betreceipt transactions:	5272497
Number of lost betreceipt transactions:	1228
Percentage of lost betreceipt transactions:	0.023285249
Total wagers, EOS:	48185195.9189
Total payouts, EOS:	47289940.7798
Difference, EOS:	895255.1391
Difference, percent:	1.857946454
Number of players:	5455
Average wager, EOS:	9.1390
Maximum wager, EOS:	40000.0000
Average payout, EOS:	8.9692
Maximum payout, EOS:	41912.0000

This report is based on data exported by nodeos ZMQ plugin. The script 'eosbet_dice_getdata.pl' is extracting all actions named 'betreceipt' and 'resolvebet' issued by smart contract 'eosbetdice11', and stores them in a separate database. After that, the script 'eosbet_dice_report.pl' generates this Excel report.

The dice players are transferring EOS tokens to the 'eosbetdice11' smart contract with roll_under number specified in memo. An external oracle is calling 'betresolve' action and specifying a digital signature of the bet data by using the casino's private key. The 'betresolve' action calculates the dice rolling result between 1 and 100 from the signature bits, and if the result is above the roll_under number, the player receives the payout in EOS.

At the end of processing, 'betresolve' generates a deferred action named 'betreceipt'. A small number of receipts is lost in EOS network because of congestion.

The following two worksheets represent chi-squared test of dice rolls. This is a standard statistical method that tests a game fairness and uniform statistical distribution. The chi-squared confidence of 1 indicates that the random distribution is completely uniform and not forged.

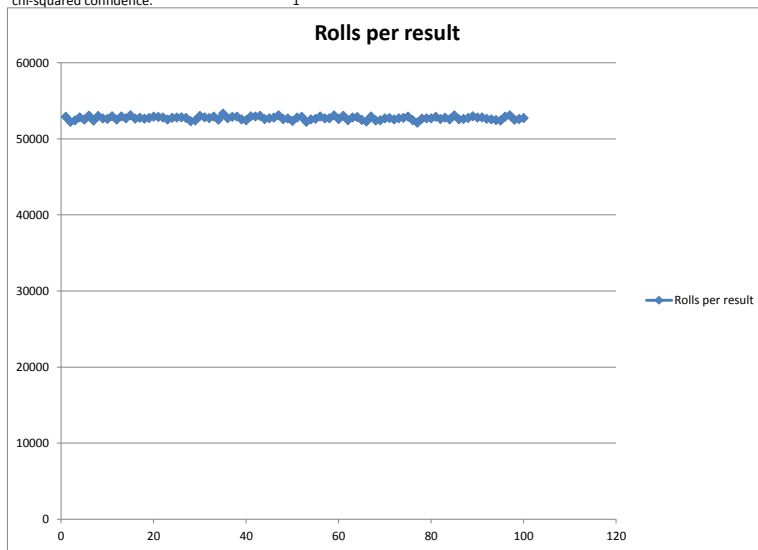
The report is generated from publicly available data on the blockchain, and with open-source tools available on GitHub at https://github.com/cc32d9/eos_game_reports

Total processing of blockchain data as of end of September takes about 4 days on a modern mid-range server.

Random roll	Count	Average
1	52904	52724.97
2	52241	52724.97
3	52442	52724.97
4	52827	52724.97
5	52538	52724.97
6	53057	52724.97
7	52407	52724.97
8	53013	52724.97
9	52693	52724.97
10	52632	52724.97
11	52981	52724.97
12	52551	52724.97
13	52954	52724.97
14	52702	52724.97
15	53103	52724.97
16	52661	52724.97
17	52786	52724.97
18	52661	52724.97
19	52748	52724.97
20	52931	52724.97
21	52887	52724.97
22	52818	52724.97
23	52549	52724.97
24	52772	52724.97
25	52812	52724.97
26	52839	52724.97
27	52758	52724.97
28	52332	52724.97
29	52424	52724.97
30	53023	52724.97
31	52837	52724.97
32	52743	52724.97
33	52936	52724.97
34	52530	52724.97
35	53320	52724.97
36	52723	52724.97
37	52906	52724.97
38	52935	52724.97
39	52567	52724.97
40	52460	52724.97
41	52967	52724.97
42	52951	52724.97
43	53029	52724.97
44	52608	52724.97
45	52713	52724.97
46	52795	52724.97
47	53101	52724.97
48	52607	52724.97
49	52689	52724.97
50	52368	52724.97
51	52799	52724.97
52	52910	52724.97
53	52247	52724.97
54	52568	52724.97
55	52634	52724.97
56	52947	52724.97
57	52700	52724.97
58	52709	52724.97
59	53095	52724.97
60	52609	52724.97
61	53045	52724.97
62	52462	52724.97
63	52822	52724.97
64	52874	52724.97
65	52496	52724.97
66	52291	52724.97
67	52947	52724.97
68	52427	52724.97
69	52452	52724.97
70	52707	52724.97
71	52742	52724.97
72	52561	52724.97
73	52708	52724.97
74	52769	52724.97
75	52931	52724.97
76	52461	52724.97
77	52130	52724.97
78	52663	52724.97
79	52701	52724.97
80	52704	52724.97
81	52904	52724.97
82	52615	52724.97
83	52793	52724.97
84	52573	52724.97
85	53098	52724.97
86	52580	52724.97
87	52623	52724.97
88	52754	52724.97
89	52978	52724.97
90	52807	52724.97
91	52823	52724.97
92	52641	52724.97
93	52572	52724.97
94	52479	52724.97
95	52419	52724.97
96	52923	52724.97
97	53102	52724.97
98	52519	52724.97
99	52612	52724.97
100	52740	52724.97

Count of all rolls per result

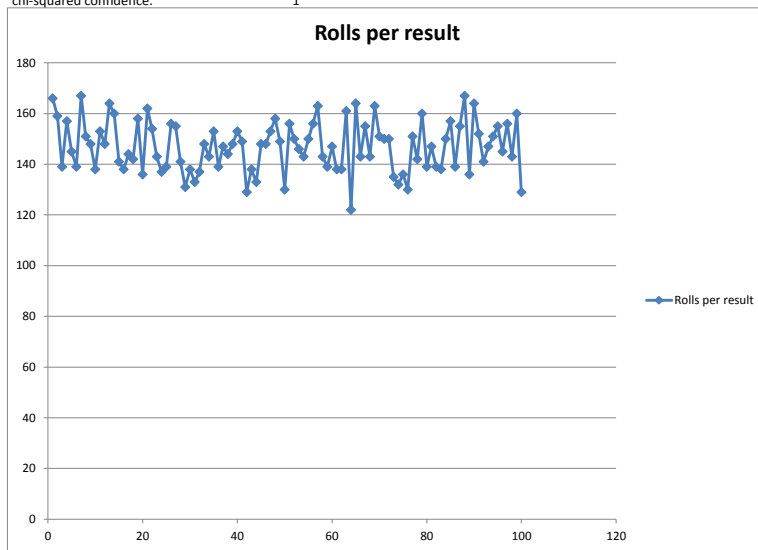
chi-squared test: 0.601898
chi-squared confidence: 1



Random roll	Count	Average
1	166	146.96
2	159	146.96
3	139	146.96
4	157	146.96
5	145	146.96
6	139	146.96
7	167	146.96
8	151	146.96
9	148	146.96
10	138	146.96
11	153	146.96
12	148	146.96
13	164	146.96
14	160	146.96
15	141	146.96
16	138	146.96
17	144	146.96
18	142	146.96
19	158	146.96
20	136	146.96
21	162	146.96
22	154	146.96
23	143	146.96
24	137	146.96
25	139	146.96
26	156	146.96
27	155	146.96
28	141	146.96
29	131	146.96
30	138	146.96
31	133	146.96
32	137	146.96
33	148	146.96
34	143	146.96
35	153	146.96
36	139	146.96
37	147	146.96
38	144	146.96
39	148	146.96
40	153	146.96
41	149	146.96
42	129	146.96
43	138	146.96
44	133	146.96
45	148	146.96
46	148	146.96
47	153	146.96
48	158	146.96
49	149	146.96
50	130	146.96
51	156	146.96
52	150	146.96
53	146	146.96
54	143	146.96
55	150	146.96
56	156	146.96
57	163	146.96
58	143	146.96
59	139	146.96
60	147	146.96
61	138	146.96
62	138	146.96
63	161	146.96
64	122	146.96
65	164	146.96
66	143	146.96
67	155	146.96
68	143	146.96
69	163	146.96
70	151	146.96
71	150	146.96
72	150	146.96
73	135	146.96
74	132	146.96
75	136	146.96
76	130	146.96
77	151	146.96
78	142	146.96
79	160	146.96
80	139	146.96
81	147	146.96
82	139	146.96
83	138	146.96
84	150	146.96
85	157	146.96
86	139	146.96
87	155	146.96
88	167	146.96
89	136	146.96
90	164	146.96
91	152	146.96
92	141	146.96
93	147	146.96
94	151	146.96
95	155	146.96
96	145	146.96
97	156	146.96
98	143	146.96
99	160	146.96
100	129	146.96

Count of rolls per result where wager is 500 EOS or higher

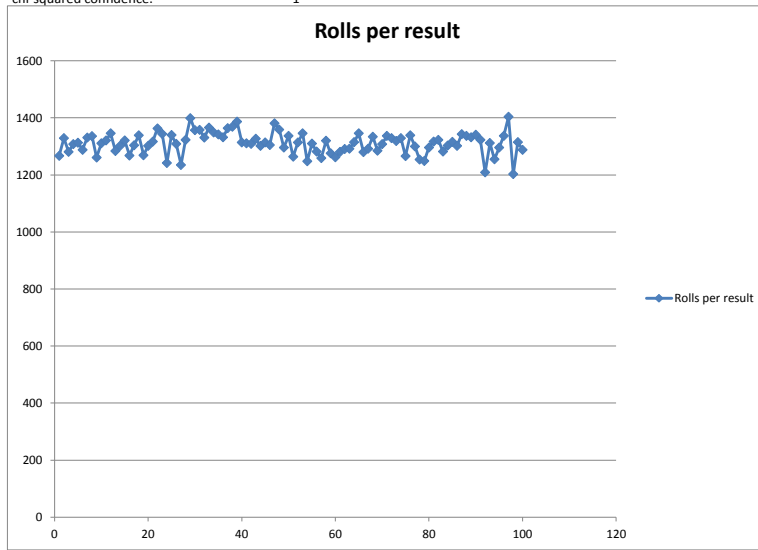
chi-squared test: 0.994931
chi-squared confidence: 1



Random roll	Count	Average
1	1267	1311.24
2	1329	1311.24
3	1281	1311.24
4	1308	1311.24
5	1313	1311.24
6	1288	1311.24
7	1331	1311.24
8	1336	1311.24
9	1261	1311.24
10	1311	1311.24
11	1321	1311.24
12	1346	1311.24
13	1284	1311.24
14	1302	1311.24
15	1321	1311.24
16	1268	1311.24
17	1304	1311.24
18	1339	1311.24
19	1269	1311.24
20	1302	1311.24
21	1317	1311.24
22	1363	1311.24
23	1344	1311.24
24	1242	1311.24
25	1340	1311.24
26	1309	1311.24
27	1235	1311.24
28	1323	1311.24
29	1399	1311.24
30	1357	1311.24
31	1358	1311.24
32	1331	1311.24
33	1366	1311.24
34	1349	1311.24
35	1342	1311.24
36	1332	1311.24
37	1364	1311.24
38	1369	1311.24
39	1387	1311.24
40	1314	1311.24
41	1311	1311.24
42	1309	1311.24
43	1327	1311.24
44	1302	1311.24
45	1314	1311.24
46	1305	1311.24
47	1381	1311.24
48	1359	1311.24
49	1296	1311.24
50	1337	1311.24
51	1264	1311.24
52	1314	1311.24
53	1346	1311.24
54	1248	1311.24
55	1310	1311.24
56	1282	1311.24
57	1259	1311.24
58	1320	1311.24
59	1276	1311.24
60	1262	1311.24
61	1281	1311.24
62	1291	1311.24
63	1292	1311.24
64	1315	1311.24
65	1346	1311.24
66	1280	1311.24
67	1292	1311.24
68	1334	1311.24
69	1285	1311.24
70	1308	1311.24
71	1337	1311.24
72	1329	1311.24
73	1319	1311.24
74	1329	1311.24
75	1266	1311.24
76	1339	1311.24
77	1300	1311.24
78	1254	1311.24
79	1249	1311.24
80	1296	1311.24
81	1317	1311.24
82	1323	1311.24
83	1282	1311.24
84	1303	1311.24
85	1316	1311.24
86	1302	1311.24
87	1343	1311.24
88	1337	1311.24
89	1332	1311.24
90	1341	1311.24
91	1323	1311.24
92	1209	1311.24
93	1312	1311.24
94	1255	1311.24
95	1296	1311.24
96	1337	1311.24
97	1404	1311.24
98	1203	1311.24
99	1315	1311.24
100	1288	1311.24

Count of rolls per result for winners of 3000 EOS or more

chi-squared test: 0.287124
chi-squared confidence: 1



Random roll	Count	Average
1	10150	9969.57
2	9942	9969.57
3	10002	9969.57
4	10039	9969.57
5	9837	9969.57
6	10016	9969.57
7	9896	9969.57
8	10049	9969.57
9	9949	9969.57
10	9961	9969.57
11	10037	9969.57
12	10010	9969.57
13	10046	9969.57
14	9922	9969.57
15	10003	9969.57
16	9939	9969.57
17	9915	9969.57
18	9831	9969.57
19	10030	9969.57
20	10020	9969.57
21	10004	9969.57
22	9956	9969.57
23	9799	9969.57
24	9903	9969.57
25	10015	9969.57
26	9946	9969.57
27	9996	9969.57
28	9912	9969.57
29	9872	9969.57
30	10043	9969.57
31	10017	9969.57
32	9757	9969.57
33	10197	9969.57
34	9924	9969.57
35	10008	9969.57
36	9897	9969.57
37	10042	9969.57
38	9958	9969.57
39	9869	9969.57
40	9811	9969.57
41	9941	9969.57
42	9909	9969.57
43	9951	9969.57
44	9827	9969.57
45	9936	9969.57
46	9997	9969.57
47	9927	9969.57
48	9918	9969.57
49	10026	9969.57
50	9799	9969.57
51	10045	9969.57
52	10038	9969.57
53	9834	9969.57
54	9925	9969.57
55	9789	9969.57
56	9971	9969.57
57	10055	9969.57
58	9934	9969.57
59	10183	9969.57
60	10126	9969.57
61	10224	9969.57
62	9802	9969.57
63	9993	9969.57
64	10020	9969.57
65	9886	9969.57
66	9939	9969.57
67	10145	9969.57
68	9876	9969.57
69	10025	9969.57
70	9943	9969.57
71	9939	9969.57
72	10119	9969.57
73	9995	9969.57
74	10089	9969.57
75	10045	9969.57
76	9796	9969.57
77	9829	9969.57
78	10057	9969.57
79	10134	9969.57
80	10023	9969.57
81	9866	9969.57
82	9892	9969.57
83	9927	9969.57
84	9937	9969.57
85	9964	9969.57
86	10061	9969.57
87	9921	9969.57
88	10179	9969.57
89	10083	9969.57
90	9997	9969.57
91	9909	9969.57
92	9763	9969.57
93	9824	9969.57
94	10040	9969.57
95	9847	9969.57
96	10011	9969.57
97	10134	9969.57
98	10150	9969.57
99	9833	9969.57
100	10089	9969.57

Count of rolls per result for losers of 3000 EOS or more

chi-squared test: 0.256488
chi-squared confidence: 1

